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WASSERMANN AND KAHN REACTIONS: AN ANALYSIS OF 460 TESTS.

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SEROLOGICAL TESTS for syphilis are of two types, complement fixation tests, such as the Wassermann test, and flocculation tests, such as the standard Kahn test, and because neither is absolutely reliable, tests of both types are often carried out in parallel. There is no doubt about the importance of these serological reactions in the diagnosis of syphilis; but opinions differ on the value of repeated testing in following the course of the disease and assessing the effectiveness of treatment.

Although several reviews of the results of serological tests have been published, it is not possible to get a true picture of the relationship between the two types of tests. The results are usually presented as numbers of tests performed without mention of the number of patients involved, the number of times tests have been repeated in the same case, the stage of syphilis or the duration of treatment. Moreover, the measure of agreement between, say, Wassermann and Kahn reactions is usually expressed as a percentage of the total number of tests performed and is biased by the number of completely negative results in the series. For example, Osmond (1950) found that his results by the Wassermann and Kahn techniques agreed in 95% of 2223 tests; but if we exclude the 1899 tests in which completely negative results were obtained, the agreement is found to be only 72%.

In the study reported here we aimed to get a more precise measure of the agreement between Wassermann and Kahn ractions by analysing the results of parallel tests made on different occasions during treatment in the two years after diagnosis in 115 cases of different forms of syphilis.

METHODS.

This analysis deals with the results of 460 tests, complement fixation and flocculation tests performed in parallel, in 115 cases. The patients selected for this study are all those who first attended the Venereal Diseases Clinic of this hospital after 1946 and satisfied the following criteria: (*a*) They were diagnosed as suffering from syphilis because one or both serological tests produced positive reactions or the spirochætes were demonstrated. (*b*) They were then under continuous treatment and observation for two years. (*c*) Their serological reactions were tested subsequently on at least three occasions, six to eight months apart. Thus each patient had four tests spread over four periods of time. The patients have been grouped in accordance with the clinical classifications of primary syphilis (29 patients), secondary syphilis (26), latent or symptomless syphilis (30), and tertiary syphilis (30). Treatment in nearly all cases included courses of penicillin, arsenic and bismuth; a few had iodides as well.

The techniques used were, in the case of the Wassermann test, a slightly modified form of that described by Griffiths and Scott (1920), in which all factors are kept constant except the percentage of cells, and the flocculation test described by Shearman and Millar (1945), which is a modification of the Eagle test with the use of Kahn antigen. These will be referred to in the text as the Wassermann test and the Kahn test. The tests were carried out simultaneously, the results of the Wassermann test being read

Table Ia.
The Extent of Agreement in Different Stages of Syphilis.

Stage of Disease.	Number of Tests Showing.				Percentage of Tests in Agreement.	
	Agreement.		Disagreement.			
	W+ K+	W− K−	W− K+	W+ K−	Positive and Negative Results.[1]	Positive Results Only.[1]
Primary	14	93	7	2	92	61
Secondary	32	65	6	1	93	82
Latent	78	24	13	5	85	81
Tertiary	87	17	13	3	87 (*a*)	84 (*b*)
Total	211	199	39	11	89	81

[1] For (*a*), $\chi^2 = 5{\cdot}92$, $n = 3$, $p = 0{\cdot}10$ to $0{\cdot}20$; for (*b*), $\chi^2 = 6{\cdot}85$, $n = 3$, $p = 0{\cdot}05$ to $0{\cdot}10$.

by one person and those of the Kahn test independently by another. It is customary in this hospital to record the Wassermann test result as "complete positive", "strong incomplete positive", "incomplete positive", "weak incomplete positive" or "negative". These results have been expressed as "4+", "3+", "2+", "1+" or "negative" respectively for the purpose of the present study, to correspond with the usual method of grading the intensity of the Kahn reaction.

The results have been examined from two points of view: (*a*) to see the extent of agreement between the Wassermann test and the Kahn test, agreement in the estimated intensity or grading of positive reactions being taken into consideration as well as agreement simply in the result being "positive" (of any grade) or "negative", and (*b*) to see which of the two tests is the more sensitive in that its result is the first to become positive after the disease is contracted and is more frequently positive during the disease, and in that it indicates the effectiveness of treatment. Each aspect has been further examined in terms of the four stages of syphilis and the four periods during treatment. The ordinary χ^2 test with Yates's correction for small numbers has been used in the statistical analyses (Fisher, 1950).

Results.

The Agreement between Wassermann and Kahn Tests.

The first aspect of the results to be discussed is the agreement between the Wassermann and Kahn tests.

In the Result's Being Positive or Negative.

Over the Whole Series.—Of all the 460 tests which are the subject of this review, 410, that is 89%, showed agreement between the results of the Wassermann and Kahn tests, the results being positive in 211 and negative in 199. If all results which were completely negative are disregarded and only those results which were positive in either or both tests are examined, there was agreement in 81% (Table I).

In Different Stages of Syphilis.—The results of the tests agreed to much the same extent in each of the four stages of syphilis. Agreement among all tests, whether the results were positive or negative, varied from 85% to 93%. If the "double negative" results are excluded, agreement varied from 61% to 84% (Table Ia). In neither case is the variation significant, but there is a suggestion of poorer agreement (61% of positive reactions) in primary syphilis.

At Different Periods During Treatment.—The overall agreement between Wassermann and Kahn tests—that is, both positive and negative results being included—was the same in each of the four periods during treatment (Table Ib). However, when the "double negative" results are excluded, the agreement among positive results declines significantly as treatment proceeds. Thus the agreement between the Wassermann and Kahn tests falls from 89% of the positive results at the initial examination to 66% in the fourth period. Further subdivision of these data shows that this decrease in agreement during the two-year period is more pronounced in some types of syphilis than in others (Table II). Very little decrease in agreement occurred in tertiary syphilis, even though the total number of positive results fell from 30 to 15. The decrease was more evident in latent syphilis, and even more so in the secondary and primary stages of the disease.

In the Intensity of the Reactions.

Over the Whole Series.—Table III shows the frequencies with which the different gradings of intensity of the reactions were recorded in the total 460 tests. In 349 tests, 76% of the whole series, the Wassermann and Kahn tests had the same grading. Of the remainder the Wassermann test was graded higher than the Kahn test in 60 tests and lower in 51—an insignificant difference ($\chi^2 = 0{\cdot}72$, $n = 1$, $p = 0{\cdot}3$ to $0{\cdot}5$). If the "double negative" results are disregarded, the Wassermann and Kahn test results agreed in their grade of positivity in 150 of 261 tests—that is, 57%. If the results are regrouped according to the international classification, "positive" (to include our "4+" and "3+"),

Table Ib.
The Extent of Agreement at Different Periods During Treatment.

Period of Treatment.	Number of Tests Showing.				Percentage of Tests in Agreement.	
	Agreement.		Disagreement.			
	W+ K+	W− K−	W− K+	W+ K−	Positive and Negative Results.[1]	Positive Only.[1]
First	94	9	10	2	89	89
Second	51	54	9	1	91	84
Third	35	68	10	2	89	74
Fourth	31	68	10	6	86 (*a*)	66 (*b*)
Total	211	199	39	11	89	81

[1] For (*a*), $\chi^2 = 1{\cdot}70$, $n = 3$, $p = 0{\cdot}50$ to $0{\cdot}70$; for (*b*), $\chi^2 = 12{\cdot}47$, $n = 3$, $p = 0{\cdot}001$ to $0{\cdot}01$.

"doubtful" ("2+" and "1+") and "negative", then the grading of Wassermann and Kahn results agreed in 67% of the 261 tests in which some abnormality was shown. A disproportionate number of the results which do not agree are seen to lie in the "4+" and "negative" Wassermann columns. This is shown more clearly in Table IV. Three facts emerge from this table. The first is that in this series of tests "4+" and "negative" results were recorded more frequently in the Wassermann test, while "3+", "2+" and "1+" gradings were reported more frequently in the Kahn test.

TABLE II.

The Extent of Agreement in Different Stages of Syphilis at Different Times during Treatment. The Table shows the Total Numbers of Positive Results (Wassermann and/or Kahn Tests) in Parentheses and the Percentage of these Results which are Positive in Both Tests.

Stage of Syphilis.	Period During Treatment.[1]			
	First.	Second.	Third.	Fourth.
Primary	65% (20)	50% (2)	0% (1)	— (0)
Secondary ..	92% (26)	86% (7)	33% (3)	33% (3)
Latent	97% (30)	92% (24)	76% (21)	52% (21)
Tertiary	93% (30)	79% (28)	82% (22)	88% (23)

[1] $\chi^2 = 40{\cdot}00$, $n = 9$. For interaction between types and periods, $\chi^2 = 21{\cdot}17$, $n = 3$, $p < 0{\cdot}001$.

The second fact is that of all tests in which a particular grade of intensity was recorded in one or both serological reactions, the frequency with which a particular grading was given to both reactions varies with the intensity of the reaction. Thus 71% of all "4+" reactions were given the same grading with both Wassermann and Kahn tests, 32% of "3+", 25% of "2+" and only 9% of "1+". Both facts are highly significant ($p < 0{\cdot}001$). The third point is that

TABLE III.

Frequency Table for the Whole Series of 460 Tests.

Kahn Test Result.	Wassermann Test Result.				
	4+	3+	2+	1+	Negative.
4+	113	1	3	—	1
3+	16	15	6	2	4
2+	18	1	18	—	15
1+	5	2	7	4	19
Negative ..	2	—	4	5	199

each of the intermediate grades of the Kahn reaction has been reported about the same number of times, whereas with the Wassermann test "2+" reactions have been recorded more frequently than "3+" and "1+" reactions. This is probably a reflection of the mode of reporting, in that a result might be reported as "incomplete positive" ("2+") without the qualification of "strong" ("3+") or "weak" ("1+").

In Different Stages of Syphilis.—Abnormalities detected by the Wassermann and Kahn tests were given the same grading more frequently in tertiary syphilis than in the other stages of disease, and least often in primary disease (Table VA). This depends largely on the fact that agreement is greatest when the reactions are most intense, and these strongly positive results occur more commonly in disease of longer standing.

TABLE VA.

The Agreement in Grading of Intensity in Different Stages of Disease.

Stage of Disease.	Total Number of Positive Results. (W and/or K.)	Agreement in Grading. (W = K.)	Agreement.[1]
Primary	23	8	35%
Secondary	39	23	59%
Latent	96	49	51%
Tertiary	103	70	68%

[1] $\chi^2 = 11{\cdot}10$, $n = 3$, $p = 0{\cdot}01$ to $0{\cdot}02$.

At Different Periods During Treatment.—The agreement in grading of Wassermann and Kahn tests decreased from 63% of all positive results at the initial examination to 42% at the fourth examination (Table VB). This trend of decreasing agreement as treatment proceeds is less pronounced in disease of longer standing, such as tertiary syphilis, than in disease of shorter duration (Table VI). Again, this is related to the finding that agreement decreases with the intensity of the reactions.

TABLE VB.

The Agreement in Grading of Intensity at Different Periods During Treatment.

Period of Treatment	Total Number of Positive Results. (W and/or K.)	Agreement in Grading. (W = K.)	Agreement.[1]
First	106	67	63%
Second	61	38	62%
Third	47	25	53%
Fourth	47	20	42%

[1] $\chi^2 = 6{\cdot}56$, $n = 3$, $p = 0{\cdot}05$ to $0{\cdot}10$.

The More Sensitive Reaction.

Up to the present the analysis has been concerned with the agreement between Wassermann and Kahn reactions. What follows is an examination of those tests in which the Wassermann and Kahn results disagree, to see whether one test is a more reliable or sensitive indicator of the presence of syphilis and of response to treatment.

The First Test Whose Result Becomes Positive.

The numbers of patients who, at the initial test, gave positive reactions to one or other but not to both serological tests are shown in Table IB. The Kahn test result was positive in 10 cases and the Wassermann test result in two ($p = 0{\cdot}02$ to $0{\cdot}05$). Whether this is a valid indication of

TABLE IV.

Relation Between Wassermann and Kahn Results having the Same Grading of Intensity.

Grading of Result.	Wassermann (W)	Kahn (K)	Difference (W−K).[1]	Total W and/or K.	Agreement (W = K).	Agreement.[2]
4+	154	118	+36	159	113	71%
3+	19	43	−24	47	15	32%
2+	38	52	−14	72	18	25%
1+	11	37	−26	44	4	9%
Negative ..	238	210	+28	—	—	—

[1] $\chi^2 = 32{\cdot}04$, $n = 4$, $p < 0{\cdot}001$.
[2] $\chi^2 = 80{\cdot}4$, $n = 3$, $p < 0{\cdot}001$.

which serological reaction is the first to produce a positive result after the disease is contracted is doubtful, as seven of these patients (two in the Wassermann group, five in the Kahn group) had primary syphilis and had started treatment prior to the first serological examination; when these are excluded the difference is no longer significant ($p = 0.05$ to 0.10).

TABLE VI.

The Extent to which Wassermann and Kahn Test Results Agree in Grading of Intensity in Different Stages of Syphilis at Different Times during Treatment, Expressed as Percentages of All Positive Results. The Total Number of Positive Results in Each Cell are in Parentheses.[1]

Stage of Syphilis.	Period During Treatment.			
	First.	Second.	Third.	Fourth.
Primary	35% (20)	50% (2)	0% (1)	— (0)
Secondary ..	73% (26)	57% (7)	0% (3)	0% (1)
Latent	57% (30)	58% (24)	52% (21)	33% (21)
Tertiary	80% (30)	68% (28)	64% (22)	57% (28)

[1] $\chi^2 = 29.36$, $n = 9$. For interaction between types and periods, $\chi^2 = 11.70$, $n = 3$, $p = 0.001$ to 0.01.

The Test Producing the More Frequently Positive Reaction.

In the Whole Series.—Of 261 tests in which positive results were obtained to one or other or both serological reactions, the Kahn test result was positive a greater number of times than the Wassermann result—in 250 as opposed to 222, that is, in 96% as opposed to 85% (Table VII). In 39 instances the Kahn result was positive while the Wassermann result was negative; the reverse was true in only 11 tests.

TABLE VII.

The Kahn and Wassermann Tests in the 261 Positive Results.[1]

Test.	Positive.	Negative.
Kahn	250	11
Wassermann	222	39

[1] $\chi^2 = 17.34$, $n = 1$, $p < 0.01$.

In Each of the Different Stages of Syphilis and at Different Periods during Treatment.—The Kahn test result is more frequently positive than the Wassermann result, and to much the same extent, in each of the different stages of syphilis (Table IA and Table VIII) and at different periods during treatment (Table IB and Table VIII).

As an Indicator of the Effectiveness of Therapy.

The First Test Whose Result Decreased in Intensity.—If we take notice of the first change in grading of the "double positive" test results we find that the Wassermann and Kahn reactions decreased simultaneously in 66 cases, neither decreased in eight cases, and in only 20 cases did one reaction decrease in intensity before the other. In these the Wassermann reaction changed first as frequently (11 cases) as the Kahn reaction (nine cases).

The First Result to become Negative.—In 22 instances the result of one test became "negative" before that of the other. The Wassermann result reverted first much more frequently (19 cases) than the Kahn result (three cases) ($p < 0.001$).

Indicating the Trend of Therapy.—Changes in the serological reactions during the course of treatment can be used to indicate the relative resistance to therapy of the different forms of syphilis. Two methods for comparing the Wassermann and Kahn tests in this role have been used. First, changes in intensity are shown in Figure I by plotting the average number of "+" recorded for each patient at each of the four periods during treatment. It is clear that disease of longer standing is more resistant to therapy and that the changes in Wassermann and Kahn results are remarkably similar. Secondly, the percentage of results which remained positive at each stage is shown in Figure II, and again the relation between duration of disease and resistance to reversion of the serological reactions is obvious. The figure also illustrates the fact that the Kahn test result is positive more often than the Wassermann result at all stages of the disease.

TABLE VIII.

Relative Frequencies with which Kahn and Wassermann Test Results are Positive.

Observation.	Total Number of Positive Results. (W and/or K.)	Kahn Result Positive.	Wassermann Result Positive.
Stage of disease[1]:			
Primary	23	21	16
Secondary	39	38	33
Latent	96	91	83
Tertiary	103	100	90
Period during treatment[2]:			
First	106	104	96
Second	61	60	52
Third	47	45	37
Fourth	47	41	37

[1] $\chi^2 = 0.265$, $n = 3$, $p = 0.95$ to 0.98.
[2] $\chi^2 = 0.21$, $n = 3$, $p = 0.95$ to 0.98.

Discussion.

Two main points arise from this analysis. The first is that the intensity of the serological reactions in syphilis and the changes they undergo during treatment are related to the stage or chronicity of the disease. Thus the reactions are, in general, more intense and more persistent in tertiary syphilis than when the disease is of more recent development, as in the primary and secondary stages.

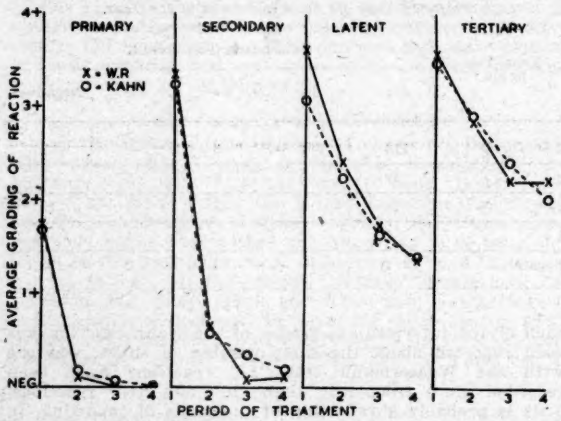

FIGURE I.

The mean effect of treatment on the intensity of the serological reactions.

Secondly, the extent to which the results of Wassermann and flocculation tests are in agreement varies with the intensity of the serological abnormality. There is better agreement when the reactions are very strongly positive than when minimal abnormalities are detected. Consequently the results of tests of the Wassermann and Kahn types show better agreement among patients with tertiary syphilis than with primary syphilis, and agreement is better when the condition is first diagnosed than when treatment has been given. Moreover, the decrease in agreement during treatment is more pronounced for patients having the earlier forms of the disease than for those in the later tertiary stage. These findings make it clear that any

statement regarding the extent to which the results of complement fixation and flocculation tests agree should be qualified by defining the stage of syphilis and duration of treatment as well as the numbers of tests and patients involved. In the present series the Wassermann and flocculation tests agreed in showing some degree of serological abnormality in 81% of all the "positive" results. There was 89% agreement at the first examination, and 66% agreement after treatment for two years. The best agreement, over 90%, was found at the initial examination of patients with latent and tertiary syphilis.

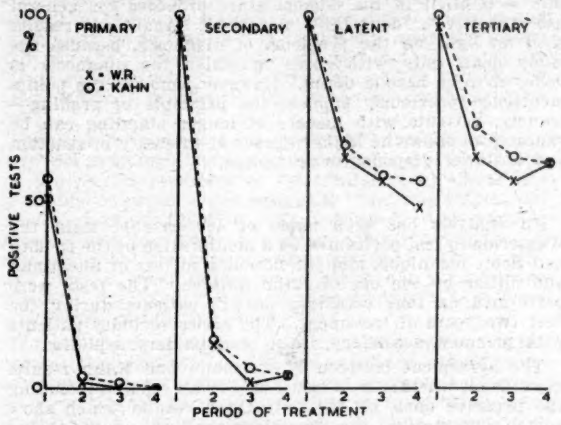

FIGURE II.

Serological reversion under treatment.

Comparison with Other Series.

It was mentioned earlier that it is difficult to arrive at a true understanding of the relationship between different serological tests for syphilis from published reviews because of the inclusion of large numbers of "double negative" results, and because it is not known how many repeated tests are included or how many patients are involved. However, if we remember that these points may detract from the validity of any conclusions drawn from these figures, it is of interest to reduce the data from some of these series into a standard form so that the results may be compared. This has been done in Table IX, in which the result of any test which shows any degree of abnormality has been called "positive".

Colquhoun, Kyles and Rannie (1945) compared the results of Wassermann, Meinicke and Sachs-Georgi reactions in numbers of voluntary blood donors, in untreated and treated patients from a venereal disease clinic, and in a general hospital series of routine examinations. Their results for the Wassermann and Meinicke "clearing" reactions in three of these groups have been included in the table to provide a comparison between the Wassermann and one of the many other methods based on the flocculation reaction in syphilis. Each test in the untreated series refers to a single patient; but the other two series include repeated tests on the same patients — particularly, of course, in the case of patients under treatment. This makes it impossible to assess the true significance of the fact that the combination of positive Meinicke with negative Wassermann results occurred more frequently in the treated series than among the untreated patients. The conclusion drawn by the authors was that the Meinicke reaction is more persistent than the Wassermann under treatment, which would be in accord with our findings with the Kahn reaction. Their figures for the untreated patients suggest that the Meinicke test, unlike the Kahn test, is less sensitive than the Wassermann test in detecting syphilis.

Heggie, Maguire, Bull and Heggie (1947) have published the largest series of positive results. Most of these tests were carried out before penicillin was introduced as treatment for syphilis; but examination of their Royal Naval Hospital series suggested to them that the Kahn test result remained positive longer than the Wassermann result in the few patients who had received penicillin. They attributed this increase in discrepancies of the type "Kahn-positive, Wassermann-negative" to reduction in antibody formation due to the effective action of penicillin on the spirochætes, but recognized that the frequent repetition of tests on these patients may have confused the issue by adding unduly to the list of discrepancies. However, this longer persistence of the Kahn reaction is confirmed in our own series. The extent to which the two serological tests agree in their general hospital series is very similar to that of Colquhoun *et alii* and also to series B of Osmond (1950). In each of these series the Wassermann test result was positive slightly more often (88% to 90%) than the Kahn or Meinicke result (83% to 86%), and both results were positive in about 74% of all tests which showed any serological abnormality.

Osmond (1950) gives the results of two series. In series A the antigen for the Kahn test was supplied by Kahn himself, and the results suggest that the test was more sensitive than in series B, for which antigen was supplied from other sources. In the first series the Kahn result was positive more often than the Wassermann result (96% as opposed to 82% of all positive results) and both serological tests gave positive results in 78%. These figures are much the same as ours.

These comparisons with other series are based on whether the serological reactions show any abnormality at all or give completely negative results. It is also possible to make comparisons on the basis of grade of abnormality reported in these series. For this purpose we have used the international system of grading—"positive", "doubtful"

TABLE IX.

Comparison of Results Obtained in Different Series.[1]

Author or Series.	Total Positive Results.	Positive Results.		Agreement. Wassermann and Kahn Results Positive.	Disagreement.	
		Wassermann Test.	Kahn Test.		Wassermann Positive, Kahn Negative.	Wassermann Negative, Kahn Positive.
Colquhoun *et alii* (1945):						
Untreated venereal disease ..	185	95%	88%	83%	12%	5%
Treated venereal disease ..	677	76%	95%	72%	5%	23%
General hospital series ..	497	89%	83%	72%	17%	11%
Heggie *et alii* (1947):						
Royal Naval Hospital ..	1294	85%	89%	74%	11%	15%
General hospital	651	90%	83%	74%	16%	10%
Ormond (1950):						
A	324	82%	96%	78%	4%	18%
B	348	88%	86%	74%	14%	12%
Present series	261	85%	96%	81%	4%	15%

[1] Positive results include those graded as doubtful. Colquhoun's figures are for Meinicke and not Kahn reactions.

and "negative"—reclassifying our own data so that "4+" and "3+" are regarded as "positive" and "2+" and "1+" as "doubtful". Table X shows the percentage of parallel results in different series which were given the same grading in the Wassermann tests as in the Kahn or Meinicke test, and the percentage of results which differed to a minor or major extent. A discrepancy between the results of parallel tests is considered "major" when the reading in one is positive and in the other negative, and "minor" when the reading in one is doubtful and in the other positive or negative. The similarity of results from the different series is surprising, especially when one considers the factors likely to cause differences, such as technique, sensitivity of antigen, the inclusion of repeated tests and different types of syphilis.

TABLE X.

Agreement and Disagreement Expressed as Percentages of All Positive or Doubtful Results with One or Both Serological Tests.

Series.	Agreement in Grading.	Discrepancies.	
		Minor.	Major.
Colquhoun:			
Untreated	73	22	5
Treated	46	48	6
General hospital ..	60	36	4
Heggie:			
Royal Naval Hospital..	65	28	7
General hospital ..	67	26	7
Present series	67	30	3

The Value of Doing Both Tests.

The value of performing both tests relates mainly to diagnosis. The ideal test for syphilis would be one whose result is always positive when the disease is present and always negative when the disease has not been contracted or has been cured. Neither the Wassermann nor the Kahn test fulfils these requirements; how much closer do we approach to this ideal by using both Wassermann and Kahn tests? The present study can provide only a partial answer, because it deals solely with cases of syphilis in which positive serological reactions have been obtained or in which organisms have been demonstrated. Of the 115 patients in the series, nine with primary syphilis were serologically "negative" and 106 had a positive serological reaction at the first examination. Among the latter, two cases of primary syphilis would have been missed if the Kahn test alone had been used. If only the Wassermann test had been used, ten cases would have been missed—five of primary syphilis, two of secondary syphilis, one of latent syphilis, and two of tertiary syphilis. Thus the Kahn test was more useful than the Wassermann test in diagnosis. In fact, the Wassermann test added nothing more to the Kahn findings than confirmatory evidence of serological abnormality in 94 of 104 cases, and diagnostic evidence in two additional cases which, as chancres were present, might perhaps have been diagnosed by other means, and in which the negative Kahn result might have been due to the phenomenon of prozoning.

The Value of Repeated Tests.

The object of repeating serological tests at intervals is to learn whether therapy is effective, whether the disease has been cured and whether exacerbation or recurrence has taken place—this is to assume that the serological abnormality in syphilis bears some relation to activity of the disease, a subject which we do not intend discussing. Our results give no information about cure or recurrence, but show that repeated tests are useful for following the effectiveness of treatment, at least in so far as the serological disturbance is concerned. As treatment proceeds, the serological reaction decreases in intensity and becomes "negative", rapidly in the primary and more slowly in the secondary, latent and tertiary stages of syphilis, in that order. This trend during treatment is shown equally well by the Kahn test as by the Wassermann test; but the Kahn reaction is usually graded higher than the Wassermann and persists longer. It is worth while repeating both tests to have the double measure of serological change.

The Value of Grading Results.

It is worth while giving some indication of the degree of abnormality detected by the serological tests if the additional information is likely to be of any assistance in diagnosis, in estimating severity and in following the course of the disease. It is reasonable that more weight should be attached to a strongly positive result than to a very weakly positive one in the diagnosis of syphilis, and this is implicit in the nomenclature proposed for general use—"positive", "doubtful", "negative". Again our results shed no light on the problems of diagnosis, because the study deals only with cases in which the diagnosis is believed to be beyond doubt. However, some of the points mentioned previously support the principle of grading—namely, patients with disease of longer standing can be expected to show the higher grades of intensity of reaction and a slower response to treatment.

SUMMARY.

An analysis has been made of 460 parallel tests, the Wassermann test performed by a modification of the Griffith and Scott technique, and the flocculation test of Shearman and Millar by the use of Kahn antigen. The tests were performed on four occasions on 115 patients during the first two years of treatment. The series includes patients with primary, secondary, latent and tertiary syphilis.

The agreement between Wassermann and Kahn results depends on whether it is based on (*a*) all results, including the negative ones, or (*b*) only those results which show some abnormality, the "double negative" results being excluded. In (*a*) the Wassermann and Kahn tests agreed in showing some abnormality or in producing negative results in 89% of all tests and had the same grading ("4+", "3+", "2+", "1+" or "negative") in 76%. This was the same for all stages of the disease and at all periods during treatment. In (*b*) the Wassermann and Kahn tests agreed in showing some abnormality in 81% of tests and had the same grading of abnormality in 57%; but this varied with the stage of disease and with the period of treatment. Agreement was greater in tertiary syphilis than in disease of shorter duration, and it was greater at the time of diagnosis than as treatment proceeded. The decrease in agreement under treatment was more pronounced in disease of shorter duration.

The flocculation reaction was positive more often than the Wassermann reaction and persisted longer.

The results are compared with other series, and the value of performing both serological tests, of repeating the tests during treatment and of grading the results is discussed.

ACKNOWLEDGEMENTS.

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RENAL TRACT INFECTION.[1]

By RALPH READER,
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INFECTION of the renal tracts—pyelitis or pyelonephritis—is a common disease in general practice, and I have no doubt that the majority of this audience sees more of such cases than the consultant physician. This applies particularly to the acute infections, which are so common and which clear up so readily that the disease generally causes little concern. There are, however, two matters which are of particular interest to the physician, and in introducing this seminar I propose to lay particular emphasis upon them.

The first is that the term "pyelitis" is misleading, and when the symptoms usually attributable to that condition are present, involvement of interstitial renal tissue has invariably occurred. The second is that this interstitial infection may smoulder on, symptomless or with periodic exacerbations, to produce a state of chronic nephritis. It is probable that many, if not the majority, of patients who have died of renal failure or of malignant hypertension considered due to chronic glomerulo-nephritis have suffered in fact from chronic pyelonephritis.

If these observations are accepted, then treatment of the acute attack, and particularly the recurrent attack, must be undertaken with greater deliberation than heretofore, and chemotherapy must be directed to an interstitial lesion rather than to the sterilization of the urine alone. Our purpose in this seminar is to consider the general picture of pyelonephritis in the light of these concepts.

Ætiology.

The causal organisms are well known. *Escherichia coli* is by far the commonest, and in the absence of bacteriological facilities it seems reasonable to assume that this is the organism responsible and to institute therapy on this assumption. Only when the infection is uncontrolled after four or five days of treatment is it necessary to make a cultural examination of the urine and to determine the sensitivities of the organisms to the common antibiotics. In a series of 124 patients with acute or chronic pyelonephritis admitted over a period of eighteen months to the Royal Prince Alfred Hospital, Sydney, the common pathogenic organisms cultured and their frequency are shown in Table I.

Pathogenesis.

There is still only indirect evidence as to the route of infection; but whether it is via the ureter or via the periureteral lymphatics or blood borne, certain predisposing factors seem to be significant. These are the frequency of occurrence in the female sex, in children and in pregnancy, obstruction to urine flow by calculi, prostatic hypertrophy, congenital abnormalities and aberrant vessels, neurological lesions of bladder control and *diabetes mellitus*.

The frequency in women and little girls is perhaps the most significant observation, suggesting a direct invasion along the urinary passages. Yet it has been shown (Guyon and Albarran, 1890) that in animals organisms introduced into the bladder do not reach the upper urinary passages unless there is obstruction to urine flow. The column of still urine is apparently necessary for ascent of bacteria, either by their own motility or as a result of movements of the host. Although we may admit the probability of bladder infection by *E. coli* in women and girls, it is difficult to accept that all such patients have an associated urinary obstruction.

The classical onset of acute pyelonephritis with rigors, fever and toxæmia suggests a preliminary blood infection with secondary involvement of the renal tissues. Cabot and Crabtree (1916) obtained a growth of *E. coli* on culture from the blood of 13 of 32 patients with acute pyelonephritis and described one case in which urine examination had revealed no abnormality immediately before an abrupt onset of toxæmia and the urine had remained normal immediately afterwards, while the blood yielded a pure culture of *E. coli* one and a half hours after the onset. Culture of the urine gave positive results next morning.

With either route of infection a damaged or abnormal or obstructed kidney is a predisposing factor to lodging of the organisms and to their growth.

The majority of infecting organisms, from their nature, come from the gut, and it is possible that the anatomy of the female large bowel, especially in children and during pregnancy, is a predisposing factor to blood infection, and in this way is more significant in the pathogenesis of renal infection than is the anatomy of the female urethra.

Pathology.

The natural history of the disease from the acute initial stage to the terminal state of renal failure or hypertension has been clearly shown by the clinico-pathological studies of Weiss and Parker (1939). They were able to recognize in their autopsy material four stages: acute pyelonephritis (pyelitis), chronic pyelonephritis, healed pyelonephritis and healed, recurrent pyelonephritis.

In their series of 100 autopsies on patients with pyelonephritis there were 15 whose kidneys showed the lesions of acute pyelonephritis; not all the subjects had manifested the symptoms of pyelitis before death. In all cases but one the infection of the pelvis was associated with suppuration throughout the interstitial tissue of the kidney. They considered that "pyelitis" practically never exists without accompanying pyelonephritis". Supporting this view is the experiment of Kennedy (1932), in which he induced both blood-borne and ascending renal tract infection. Serial histological studies showed that spread of infection through the kidney from the cortex or from the pelvis respectively was invariably complete within forty-eight hours.

The pelvis is engorged and infiltrated by leucocytes, and there are multiple foci of suppuration, either circumscribed

[1] Read at a meeting of the New South Wales Branch of the British Medical Association on October 24, 1953, at Goulburn.

TABLE I.

Organisms Grown on Culture from Urine: 124 Patients with Acute and Chronic Pyelonephritis.

Type of Pyelonephritis.	Number of Patients.	Patients with One or More Positive Urine Cultures.	Organism Grown from Urine.						
			Escherichia Coli.	*Bacillus Proteus.*	Hæmolytic *Staphylococcus Aureus.*	*Bacillus Pyocyaneus.*	*Streptococcus Fæcalis.*	*Staphylococcus Albus.*	*Bacillus Aerogenes.*
Acute ..	72	55	48	9	7	5	3	3	0
Chronic ..	52	39	35	9	3	2	2	0	4
Total ..	124	94	83	18	10	7	5	3	4

or as radiating streaks of pus throughout the medulla and cortex of the kidney.

The characteristic feature in the chronic state is the irregular scarring in a grossly contracted kidney. This contrasts with the even, granular scarring of the contracted kidney in glomerulo-nephritis.

In the chronic stages large areas of interstitial fibrosis embracing fibrosed and obliterated glomeruli lie alongside areas of normal cortex, in which glomeruli are hypertrophied, and dilated tubules are filled with pink-staining casts resembling the colloid of thyroid vesicles, giving rise to the term "thyroid kidney". The blood vessels are involved in the inflammatory process primarily, but later show the changes of arterial hypertension.

Table II.

Complications in 124 Cases of Acute and Chronic Pyelonephritis.

Complications.	Acute Pyelonephritis.		Chronic Pyelonephritis.	
	Male Patients.	Female Patients.	Male Patients.	Female Patients.
Calculus	1	2	9	6
Prostatitis	4	—	3	—
Diabetes	—	3	—	1
Bowel lesions	1	3	—	2
Congenital lesions	1	1	1	3
Neurological lesions	1	—	1	—
Coronary occlusion	1	—	1	—
Pregnancy	—	1	—	1
Chronic glomerulonephritis	—	1	—	—
Total number with complications	9	11	15	13
Total number with pyelonephritis	15	57	21	31

Clinical Manifestations.

In acute pyelonephritis toxæmia may be very severe, and especially in children may be the only evidence of infection. The sudden onset of a rigor followed by headache, fever and vomiting is a classical method of presentation. The toxæmia may be less acute, and renal tract infection is always a possible cause of unexplained nausea and vomiting and of symptomless pyrexia.

Symptoms due to the local lesion are abdominal or lumbar pain, dysuria, and rarely hæmaturia. In the series of patients mentioned above, 72 suffered from acute infection and 63 were able to give a history. Of these, 24 had abdominal pain and a similar number had loin pain, but only three complained of pain at both sites. Frank hæmaturia was present in four. There were 13 who had no symptoms of dysuria.

Urinary changes will be discussed in detail by Dr. Johnston; but in this series proteinuria occurred in about one-third of the cases. Microscopically evident hæmaturia was present in 43. Leucocytes were found in the urine of all but two patients, both of whom had typical histories, and organisms were grown on culture from their urine. Leucocytosis (more than 10,000 per cubic millimetre) occurred in 23 of 48 patients in whom a count was made.

Symptomatology in the chronic cases is extremely variable. Patients fall into three broad groups. Those of the first suffer from chronic lumbar pain, general ill health and recurrent attacks of fever and dysuria. In the second group there are no symptoms of renal infection, but the condition is discovered in patients suffering from an associated and predisposing condition—calculus, prostatic hypertrophy, carcinoma of the bladder, *diabetes mellitus* and so on. In the third group the diagnosis is made only at autopsy, there are no renal symptoms during life, and death is due to an unrelated cause or possibly to hypertension secondary to unsuspected renal disease.

In all three types of case renal failure or hypertension may be present. It is difficult to say in how many hypertensives pyelonephritis is the underlying cause. It is undoubtedly responsible for more cases of hypertension than has been suspected in the past. It is probably of great importance in the ætiology of many cases of malignant hypertension. Saphir and Taylor (1952) considered that it was responsible for all but one of 50 cases of malignant hypertension in which autopsy was performed over a period of ten years. In their control series of 50 cases of less severe hypertension seven subjects were considered to have pyelonephritis. In Weiss and Parker's series there were 71 with chronic pyelonephritis, of whom 17 had severe hypertension with diastolic pressures of 130 to 220 millimetres of mercury. Of 20 with unilateral pyelonephritis, 10 were hypertensives and five of these had diastolic pressures over 140 millimetres of mercury. On the other hand, hypertension is by no means invariable, and in the latter series there were many patients who

Table III.[1]

Solubility of Sulphonamides and Sulphonamide Combinations in Normal Urine at Various pH Levels.

Sulphonamide.	Milligrammes per 100 Cubic Centimetres.		
	pH 4·5.	pH 6·0.	pH. 7·5.
Sulphadiazine	11·5	47·6	100
Sulphamerazine	25	56	120
Sulphamethazine	52	80	120
Sulphathiazole	61	96	150
"Gantrisin"	73	260	530
Equal parts of: Sulphadiazine, Sulphamerazine, Sulphamethazine	54	101·6	176
Equal parts of: Sulphadiazine, Sulphathiazole, Sulphamerazine	52	108	205

[1] Adapted from Rhoads *et alii* (1952).

Table IV.

Sensitivity of Common Organisms to Antibiotics.

Organism.	Total Number of Cases.	Sensitive to All Four.	Sensitive to None.	Insensitive to				
				Streptomycin.	Aureomycin.	Chloramphenicol.	Terramycin.	Penicillin.
Escherichia coli	83	45	2	21	26	17	10	—
Bacillus proteus	18	2	0	3	15	7	14	—
Hæmolytic *Staphylococcus aureus*	10	2	3	6	7	6	7	9
Bacillus pyocyaneus	7	2	3	4	4	4	1	—
Streptococcus faecalis	5	3	2	2	2	2	2	—

TABLE V.[1]
Choice of Antibacterial Agents in Urinary Tract Infections.

Agent: Adult Minimum Daily Dose: Minimum Duration of Therapy.	Organism.[2]							
	E. Coli.	*Str. Fæcalis.*	*Ps. Aeruginosa.*	*Proteus.*	*A. Aerogenes.*	*K. Pneumoniæ.*	*Staph. Aureus or Albus.*	*Str. Hæmolyticus.*
Aureomycin: 2 grammes: 7 days	1	1	3	*B.*	3	2	1	2
Terramycin: 2 grammes: 7 days	1	1	2	—	2	2	1	2
Chloramphenicol: 2 grammes: 7 days	1	1	—	1	2	2	3	—
Streptomycin: 1 to 2 grammes: 7 days	2	2	2	2	2	2	—	—
Penicillin: 8,000,000 units: 7 days	—	2	—	2	—	—	2	1
"Gantrisin": 6 grammes: 10 days	2	3	2	1	2	—	3	2
"Mandelamine": 8 grammes: 10 days	3	3	—	—	—	—	—	—

[1] Adapted from Rhoads *et alii* (1952).
[2] 1 = first choice; 2 = second choice; 3 = third choice.

died of chronic pyelonephritis with normal blood pressures, and among the 20 unilateral cases eight subjects had normal blood pressures.

Langley and Platt (1947) made a study of hypertension associated with renal disease, and their results showed not only that the infected kidney was important in the ætiology of hypertension, but also that when the unilateral disease was due to pyelonephritis there was a better chance of relief of the hypertension by operative removal of the kidney.

Complications.

The present series confirms the well-known importance of complications, and the fact that these are more common in male patients and in the chronic than in the acute disease (Table II).

Treatment.

In pre-sulphonamide days therapy was directed to creating an unfavourable environment for the organism in the urine, converting it from acid to alkaline by administration of alkalis, or to producing very acid urine with mandelic acid and acidifying salts. Hexamine as a urinary antiseptic was also effective in some cases. These measures were frequently unsatisfactory, and it is unlikely that they could produce any effect on the interstitial tissues of the kidney. They have little if any place in therapy today.

Sulphonamides are at present the mainstay of therapy. It used to be considered that as a small dose produced a high concentration in the urine, one and a half to three grammes daily were adequate. With the knowledge that in most cases of acute pyelonephritis the infection is widespread through the kidney, it now seems important to produce a high blood and tissue concentration and to maintain this over a period of eight to ten days. A dose of two grammes eight hourly is necessary to maintain the blood level at five to eight milligrammes *per centum*, and, depending on the rate of absorption and excretion and the degree of acetylation, this will produce a urinary concentration of 200 to 300 milligrammes *per centum*.

With these doses attention must be paid to the solubility of the particular sulphonamide to be used. Table III shows solubilities of some of the common preparations. "Gantrisin" has been shown to be effective in urinary infections, and its high solubility makes it safe (Svec *et alii*, 1950). The mixture of three different compounds is also sound in principle, for the solubility of each is unaffected by the others, while the therapeutic effect is additive, and it has been shown that a saturated solution of one is still capable of dissolving others.

It will be noted in Table III that the solubilities increase with increasing alkalinity of the urine, and for most organisms the therapeutic effect is also enhanced. It is thus logical to administer an alkali in conjunction with the sulphonamide. A urinary output of 1·0 to 1·5 litres daily should also be maintained, and this requires special care when renal failure is present.

It is probable that as the antibiotics come down in price they will replace sulphonamides in routine treatment. At present the cost is prohibitive and they should be reserved for the resistant case. Organisms vary considerably in their sensitivities, and in-vitro sensitivities do not necessarily parallel those *in vivo*. The results of sensitivity tests in the present series of cases are shown in Table IV and suggest that chloramphenicol is probably the most effective for the whole range of organisms, though terramycin was better for *E. coli* and streptomycin for Proteus infections. The experience of Rhoads *et alii* (1952) is shown in Table V. The dosage of each of the four substances is one to two grammes daily, and administration should be continued for seven days.

In difficult cases the drug to be used and the duration of therapy should be controlled by bacteriological examination of the urine and by estimation of the sensitivity of the organism to the drugs. In such cases the combination of several drugs may be required.

Summary.

The concept of pyelitis, an infection confined to the renal pelvis and ureter, is dangerous, and even in the mildest infection renal tissue is probably involved. Progressive subclinical infection is common, and many cases of chronic nephritis, uræmia, hypertension and malignant hypertension result from such a process. Sulphonamides are at present the most useful therapeutic agents, and the more expensive antibiotics should be reserved for resistant cases. Treatment should be directed to an interstitial lesion, and high blood and tissue concentrations should be effected.

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INFECTIONS OF THE URINARY TRACT IN INFANCY AND CHILDHOOD.[1]

By C. W. G. Lee,
Sydney.

If we exclude vaginal and other contamination of the urine, the pyurias of infancy and childhood fall roughly between two extreme groups. The first and more serious type is acute hæmatogenous interstitial nephritis, occurring with or without other evidence of blood-borne infection. The renal tract involvement may be obvious or may pass unnoticed in the presence of more dramatic signs of infection elsewhere. If treatment is ineffective, the patient dies with multiple renal abscesses—this picture is common in the staphylococcal pyæmias of infancy. Or the patient may recover, with scarred and damaged kidneys, later to develop hypertension and renal failure. It is important to remember that in these cases, after the acute stage, the urinary findings may be minimal. The second type, appearing mainly in females, and most common in infants of both sexes at the napkin age, seems to be an ascending infection of the bladder and the lower part of the urinary tract. These are less serious infections as a rule: but if urinary stasis due to organic obstructive lesions or sphincteric disturbances is present, ascending infection to the kidney may occur.

As it is difficult or impossible in many cases to decide how extensive is the involvement of the urinary tract, I agree with the suggestion made by many writers that it is wise in all cases to regard pyuria, contamination excluded, as an indication of actual or potential involvement of the renal parenchyma.

Today I propose to discuss briefly the following points: (*a*) some difficulties in the interpretation of urinary findings and of the symptoms of renal tract disease; (*b*) some of the clinical features of acute and chronic infections, particularly in infants; (*c*) certain points in the treatment, with particular reference to the importance and frequency of associated anomalies of the genito-urinary tract.

Difficulties in Interpreting Urinary Findings and Symptoms.

The difficulty of obtaining uncontaminated specimens of urine from small children is obvious. In females, a carefully taken catheter specimen, excluding the first urine passed, is essential. In males it is better to avoid catheterization if possible; but it is most difficult to obtain a clean mid-stream specimen from the male infant. Skilful cooperation and frequent observation by the nursing staff are essential.

Dr. Johnston will discuss the examination of the urine; but I may remind you that an increased number of leucocytes is found in the urine of neonates and of dehydrated infants.

The main symptoms whose interpretation causes difficulty are those of lower urinary tract involvement—pain, frequency of micturition and dysuria. Young children refer pain in the abdomen, whatever its cause, to the umbilical region, and are rarely able to describe pain of renal type. Infants, unable to state their distress, give the impression of acute misery and colicky pain; this appearance is not specific and is found in many conditions in infancy in which pain and discomfort are present. Teething, scurvy and earache are examples.

An accurate impression of frequency of micturition or oliguria may be obtained by an experienced and sensible mother—mothers, however, cannot always be so classified. The variations are quite wide, but roughly an infant aged from three to six months passes urine about every hour, and from six to twelve months every hour and a half, and by the age of two years can retain his urine for two hours or more. The character of the stream is important, and even in infants a rapid beginning and well-defined ending should be present. Recurrent dribbling in any position is abnormal, and suggests some form of retention. Many infants grunt when passing urine. This does not indicate dysuria and appears to be an expression of that pleasure which is said to accompany the emptying and filling of hollow viscera.

[1] Read at a meeting of the New South Wales Branch of the British Medical Association on October 24, 1953, at Goulburn.

The Clinical Picture.

The clinical picture is probably more variable in children than in adults. Generally speaking, localizing signs and symptoms are less obvious, particularly in infants.

In infants the acute illness often presents as a severe febrile illness, without localizing signs. The fever may be of any type, and rigors are common. Convulsions and vomiting are frequent; diarrhœa is less so. If neck stiffness is present and the child is pale and drowsy, meningitis may be suspected. These symptoms are more likely to be present in illnesses of longer duration, and are associated with fluid and electrolyte disturbance. Here again the rapid breathing may suggest pneumonia. More often in the early stages the child is acutely restless and miserable, and its appearance and behaviour suggest pain of colicky nature. In more prolonged unrecognized cases, severe anæmia, vomiting and jaundice are features. It is important to recognize that urinary findings may be very little in these later stages.

In less severe cases the condition may present merely as fever of varying severity, without any specific features. Urinary infection must be excluded in any case of unexplained fever.

In the chronic or recurrent cases, usually associated with anomalies of the urinary tract, failure to thrive in the infant, chronic ill health in the older child, defective growth, unexplained rickets, hypertension and anæmia are important features. I should like to emphasize the importance of anæmia as a result of recurrent or chronic renal tract infection. Chronic pyelonephritis is also important as a cause of malignant hypertension in children, more so than chronic glomerulonephritis.

One further group of importance in infancy consists of the milder infections occurring at the teething age, in which the irritable and miserable infant suffering from a urinary infection may suggest the possibility of early pink disease, cœliac disease, or perhaps scurvy.

Of the clinical picture in the older child I have little to say, except to emphasize again that urinary infections are a frequent cause of anæmia and chronic ill health. The syndrome of recurrent vomiting and fever, with or without abdominal pain, must also be considered.

Treatment.

I am indebted to Dr. Alison Garvan for the following figures from the Royal Alexandra Hospital for Children for the year ending June, 1953.

In 382 cases of pyuria—regarded clinically as pyelonephritis, and not including pyuria or bacilluria thought to be due to contamination—the following organisms were found: *Bacillus coli*, 47%; *Staphylococcus albus*, 17%; Proteus, 12%; *Staphylococcus aureus*, 6%; non-hæmolytic streptococcus, 4·5%; *Bacillus pyocyaneus*, 3%; hæmolytic streptococcus, 0·5%; mixed organisms, 10%. The sensitivities were as follows. The great majority—about 90%—of *B. coli* organisms were sensitive to chloramphenicol; about 66% were sensitive to streptomycin, just less than this to aureomycin and terramycin; about 8% were insensitive to all antibiotics tested (penicillin, streptomycin, aureomycin, chloramphenicol, and terramycin). In the Proteus infections, 66% of the organisms were sensitive to streptomycin or chloramphenicol. In the *B. pyocyaneus* infections more than half the organisms were sensitive to streptomycin. In two of three cases of non-hæmolytic streptococcal infections the organisms were sensitive to penicillin. Most organisms in both groups of staphylococcal infection were sensitive to aureomycin, streptomycin, chloramphenicol and terramycin. More than half were sensitive to penicillin.

One could perhaps mention here that tuberculosis of the renal tract appears to be rare in this country. However, it should not be forgotten. One other infection that may become more common in Australia is bilharzia. I have seen one boy who had lived in Palestine and had been treated here for some months for recurrent pyelonephritis.

He had the typical lesions in his bladder and numerous ova in terminal portions of his urine.

I have very little to add to what Dr. Reader has told you about treatment, except for the following almost categorical statements:

1. Many cases of pyuria, particularly in infants, respond to the administration of extra fluids and alkalis. One wonders if many of these are confined to the lower part of the renal tract, and certainly in an infection of any severity chemotherapy should be given as well.

2. Children require relatively higher doses of sulphonamides than adults. Apart from this difference, I believe that the usual statement that urinary infections require a smaller dose than systemic infections requires discussion. Certainly this lower dosage is effective in most cases; but if we are to assume the presence of suppurative interstitial nephritis in the severe cases, surely a full therapeutic dose is necessary.

3. I wish to emphasize the considerable difficulty in maintaining adequate fluid intake in sick children, particularly small ones, and the extra care necessary when sulphonamides are given. Intravenous therapy may be necessary.

4. With regard to the most effective sulphonamides, it is difficult to be dogmatic. The factors mentioned by Dr. Reader must be taken into account. I myself have found sulphadiazine and "Gantrisin" satisfactory, and remain to be convinced of the advantage of sulphonamide mixtures.

Finally, there are two most important things to remember in treating children with pyuria. Firstly, one must make sure that a cure has occurred. We are all aware that many infections subside rapidly with extra fluids alone, or with alkalis and sulphonamides, or spontaneously. We are, perhaps, less aware of those infections which smoulder and become chronic. After the obvious illness is over, it is necessary not only to check the urine, but to make sure that the child has recovered its previous good general health; if not, further investigations are necessary. Secondly, persistent or recurrent infection requires adequate urological examination. In later years there have been many advances in the field of pædiatric urology, in techniques such as subcutaneous pyelography, micturition cystourethrography in the diagnosis of some forms of retention of urine, and so on, and also in the recognition of the frequency of the various urinary tract malformations in children. In his text-book, Campbell has a diagram demonstrating 48 conditions which directly or indirectly cause pyuria. Many of the organic causes of obstruction are not commonly seen, but conditions, such as hypertrophied verumontanum in the male and the various sphincteric disturbances in the female are well recognized. Laidley, in 1930, emphasized the importance of sphincteric "achalasia" in the young female, with recurrent mild lower urinary tract infections.

Conclusion.

In conclusion, I refer critically to the quotation "it is not a disease you are combating; it is a microbe", to help us remember that chemotherapy is not the complete answer to urinary tract infection.

RENAL TRACT INFECTIONS: THE UROLOGICAL POINT OF VIEW.[1]

By L. D. WHEELER,
Sydney.

RENAL TRACT infections are of much concern to those in general practice as well as to the gynæcologist and the pædiatrician, and they also constitute a major urological problem. Not only are such infections distressing to the patient and disabling, but on account of the renal damage which potentially follows (in probably a higher percentage of patients than one normally believes) it behoves us to do as much as possible not only to give our patients symptomatic relief, but to guard them from the dangers of varying degrees of renal parenchymal damage.

Full investigation is indicated in all but the minor urinary tract infections (such as an infection following catheterization for post-operative retention of urine), and this is particularly true if the renal tract infection is a recurrent or persistent one, so that the underlying lesion or special cause within or adjacent to the urinary tract may be discovered and corrected if possible.

Lesions Responsible for Renal Tract Infection.

Renal tract infections may be due to lesions of the urinary tract itself or to lesions of the genital tract in both the male and the female. Infections of the female genital tract are a very common cause of cystitis and pyelonephritis.

The responsible lesions may be grouped in the following way.

A. Congenital Anomalies.

Congenital anomalies are usually only of importance if obstructive. The most serious of these anomalies are those cases of congenital upper urinary tract dilatation ("megaureter") with or without bladder-neck obstruction which present in childhood, usually as cases of advanced renal failure.

The non-obstructive congenital anomalies (such as uncomplicated duplications of the ureter) are of little significance.

B. Obstructive Lesions (Non-Calculous).

Obstructive lesions (non-calculous) may occur at the following sites: (*a*) in the urethra—urethral stricture; (*b*) at the bladder neck—obstruction from prostatic hyperplasia or prostatic carcinoma or of the bladder-neck contracture (Marion's disease) type; (*c*) in the upper part of the urinary tract—hydronephrosis and hydroureter (from many causes).

C. Calculi or Foreign Bodies.

The average case of calculous disease occurs in an uninfected urinary tract; but once infection is introduced, it often persists until the calculus is removed. Calculi cause infection to persist not only by their obstructive effect, but also even if they are not causing obstruction. (A particular problem is the now rare infection with urea-splitting organisms, in which calculi caused by the infection and persistence of the infection on account of the calculi produce a vicious circle.)

Foreign bodies, either inserted by the patient or resulting from surgical procedures, are also a cause of urinary tract infection.

D. Diverticula.

Diverticula are usually secondary to obstruction (except in the case of diverticulum of the female urethra, an often overlooked though infrequent cause of renal tract infection).

E. Specific Infections.

The actual organism responsible for the infection is of some interest. Coliform organisms are, of course, the most common infective agents. Renal tuberculosis should always be considered in the differential diagnosis of renal tract infections. Briefly, the natural history of the disease is one of an infection of the renal parenchyma, which passes on to an ulcero-cavernous lesion, which may progress to a more and more extensive pyonephrosis. Meanwhile the infected urine produces a secondary tuberculous cystitis with all the tragic effects of bladder contracture. In the male quite often the infected urine produces a secondary ascending infection of the prostate and seminal vesicle, which in turn may give rise to an infection travelling along the vas to the epididymis and in turn to the body of the testis (tuberculous epididymo-orchitis).

Sterile pyuria is the special sign *par excellence* of tuberculous renal tract infection; and when it occurs, tuberculosis must be most carefully looked for and excluded or diagnosed. Sterile pyuria is also produced by infections with the organisms of "true infective amicrobic pyuria",

[1] Read at a meeting of the New South Wales Branch of the British Medical Association on October 24, 1953, at Goulburn.

a distinct entity, which responds to intravenous arsenical therapy and may be a facet of Reifer's syndrome.

F. Spinal Cord Lesions.

Paraplegic lesions and other spinal cord lesions producing bladder dysfunction form a special problem in renal tract infections.

G. Neoplasms.

Neoplasms (if malignant), especially of the bladder, are a not uncommon cause of infection.

H. Rarer Lesions.

Rarer lesions, such as vesico-intestinal fistulæ (due usually to diverticulitis of the colon), are sometimes responsible for renal tract infections.

I. Genital Tract Lesions in the Male.

Genital tract lesions in the male, such as non-specific chronic prostato-vesiculitis, often underlie recurring pyelonephritis.

J. Genital Tract Lesions in the Female.

Genital tract lesions in the female are a particularly common cause of renal tract infection. Vaginal infections and infestations and cervical infective lesions are a common cause of renal tract lesions. Appropriate treatment directed to the genital tract is then necessary to cure the renal tract infection.

The preadolescent vulva, particularly if infected with bacteria or even when infected secondarily by bowel worms of various sorts, may be responsible for renal tract infections, and appropriate therapeutic and hygienic measures must be adopted.

Likewise the senile vulva (particularly if secondary senile urethral stenosis has taken place, which itself may require dilatation) may be responsible for cysto-pyelitis. In these cases œstrogen will help.

Investigation.

Investigation should take place somewhat along the following lines.

1. A full physical examination with special attention to the urinary and genital tracts.

2. Adequate urine examination (including tests for albumin and reducing substance and microscopic examination of the uncentrifuged specimen). Nothing can replace the actual demonstration of pus cells by the microscope, but some guide can be given by the naked eye appearance before and after boiling and acidification. If the urine is clear after boiling and the addition of acid, then it can be regarded as pus-free (for general purposes). Alternatively, a turbidity present before and after boiling and rendering the urine acid must be due either to pus or to insoluble salts, being replaced by precipitated protein.

3. Urine culture and sensitivity tests of the organism grown against the various antibiotics. It should be remembered always that, in cases of sterile pyuria, tuberculous infection must be excluded. Sterile pyuria may be due to (i) tuberculous urinary tract infection, (ii) "false sterile pyuria", that is, persistence of pus cells for a few days after the organism has been killed by sulphonamides or antibiotics, or (iii) "true infective amicrobic pyuria"—infection with some agent, perhaps the pleuro-pneumonia organism. Tuberculosis should be always uppermost in one's mind in cases of sterile pyuria.

4. Examination of the genital tract. In the male, prostatic secretion should be obtained for examination. Prostatic massage to be successful demands the utmost gentleness. Diagnostic prostatic massage is very useful, but there would appear to be little scope for therapeutic prostatic massage in modern urological treatment. In the female, examination of the genital tract is all-important.

5. Excretion urography. Excretion urography normally precedes all other special investigations. The only contraindication to excretion urography is sensitivity to the iodide-containing medium (in which case instrumental urography with sodium bromide must be substituted).

6. Cystoscopy. Cystoscopy is performed only if definitely indicated, and then when the renal tract infection is quiescent. At cystoscopy the bladder, bladder neck and prostatic urethra are examined. The remaining part of the urethra is examined with similar endoscopic instruments. Retrograde pyelography is carried out if, and only if, excretion urography is inconclusive.

Treatment.

In the first instance a renal tract infection should be treated with sulphonamides (which are the mainstay). Sulphonamides are, generally speaking, far more useful than the antibiotics, as the majority of organisms infecting the renal tract are sulphonamide-sensitive and remain so.

Practically the only contraindication to sulphonamide therapy is a history of previous allergic manifestations, such as skin rashes. Sulphonamide anuria rarely if ever occurs during the treatment of renal tract infections, as the fluid intake is not usually a problem. (Sulphonamide anuria, when it does occur, is usually associated with patients who have dysphagia, as in acute tonsillitis.)

Sulphonamides may be used on one of three dosage schedules: (i) High—for example, in treating the patient with acute pyelonephritis. (ii) Low—as in treating the average case of urinary tract infection (something of the order of three grammes daily in divided doses). (iii) A very low "suppressive" course (say, 0·5 gramme thrice daily for several months or longer); this is useful in cases of recurrent attacks of acute pyelonephritis in which the cause cannot be discovered or, if it can be discovered, cannot be eradicated.

The antibiotics are of limited use owing to the ever-present problem of development of resistance. Antibiotics find their greatest use where they are used (as they should be) on very specific indications—for example, to clear finally an infection which persists after the continuing cause (such as stone) has been removed. It is usually pointless to give antibiotics while obstruction or a stone remains, as a sensitive strain of organism will then be promptly replaced by an insensitive one.

Chemotherapeutic agents (other than the sulphonamides) have limited uses, but can be used very dramatically on specific indications—for example, arsenicals for infections with the organism of "true infective amicrobic pyuria", and "Furadantin" (a nitro-furan) for some Proteus and pyocyaneus infections.

The basic problem is, however, to investigate and remove the cause of the infection.

Conclusion.

Renal tract infections, particularly if recurrent, are an indication for full investigation of the urinary and genital tracts. Treatment (surgical or otherwise) must be directed to the underlying lesion.

Antibiotics are of limited use and should be used only on a specific indication. The sulphonamides remain the drugs which are most useful in treating renal tract infection.

BETWEEN AUSTRALIAN X-DISEASE AND THE VIRUS OF MURRAY VALLEY ENCEPHALITIS.[1]

By D. M. McLean and W. J. Stevenson.

From the Department of Experimental Medicine, University of Melbourne, the Walter and Eliza Hall Institute of Medical Research, Melbourne, and the State Health Department, Melbourne.

During the late summer and autumn months of 1917 and 1918 there were epidemics of encephalitis in the general area of the Murray-Darling basin, in both seasons with a sharp concentration of activity on the isolated mining town of Broken Hill. These were the classical outbreaks of the disease now referred to as Australian X-disease, from which Cleland *et alii* (1917) obtained a virus pathogenic for monkeys and some other animals. In all recent dis-

[1] This work was aided by a grant from the National Health and Medical Research Council, Canberra.

cussions of Murray Valley encephalitis (MVE) the probability that the 1951 epidemic was due to the virus that was responsible for the X-disease epidemics has been stressed (Anderson and Eagle, 1953; Burnet, 1952; Miles and Howes, 1953). Clinical and epidemiological evidence points strongly toward the identity of the two conditions; but it was thought desirable to attempt a more direct type of investigation.

There were some special epidemiological circumstances which suggested that a serological survey of residents of Broken Hill might supply the required information. Subsequent to the 1917 and 1918 epidemics, another small outbreak of encephalitis was reported in 1925; but none has been reported since then. It is important to note that no cases were reported from the town in the 1951 season. In view of the experience of Mildura, cases would certainly have occurred at Broken Hill (population 30,000) if encephalitis had been active there at that time. Owing to special economic circumstances there has been relatively little movement of people from the town in the last twenty years. It seemed possible, therefore, that if antibody could persist for thirty-five years in a proportion of people who were subclinically infected, a significant proportion of old residents of Broken Hill might still be carrying demonstrable antibody against the virus that was responsible for X-disease. If this was serologically identical with or closely related to MVE virus, the antibody could be demonstrated by neutralization tests with the latter virus. Results would, of course, be significant only if the positive findings were wholly or predominantly obtained in persons aged over twenty-seven years (that is, born before 1925), and particularly in persons aged over thirty-five years who could have experienced the two larger outbreaks. Absence of antibody in persons aged under twenty-seven years would indicate that, as the epidemiological evidence suggested, there had been no subsequent prevalence of infection in the area.

The present paper reports the results of tests on serum from 243 residents of Broken Hill. They are in full accord with the hypothesis (*a*) that X-disease was due to a virus serologically indistinguishable from that of Murray Valley encephalitis, and (*b*) that the virus has not been active in the Broken Hill area since 1925.

Methods and Materials.

On July 26, 1952, 243 people normally resident in Broken Hill provided samples of whole blood of five to ten millilitres each. Many were regular blood donors. The specimens were stored at 4° C. for the first forty-eight hours, after which the serum was separated and stored at – 20° C.

Neutralization Test.

Serum was thawed at room temperature (15° to 18° C.) and then heated at 56° C. for thirty minutes before use in the neutralization test. The method of French (1952) was adopted, in which groups of six suckling mice, each aged four to eight days, were inoculated intraperitoneally with 0·03 millilitre of serum-virus mixtures.

MVE virus, seed number 74439, was used throughout this series of tests. Serial tenfold dilutions of seed virus were made in a 10% suspension of heated (56° C. for thirty minutes) normal rabbit serum in physiological saline. Antibiotics were added to give final strength concentrations of penicillin, 500 units per millilitre, and streptomycin, five milligrammes per millilitre. Aliquots (0·2 millilitre) of a virus dilution which was calculated to contain between 40 and 100 mouse LD_{50} of virus were mixed with 0·15 millilitre portions of serum. The mixture was held at 4° C. for sixty to ninety minutes, and then inoculated into mice. Mice developed signs of acute encephalitis on the sixth or seventh day after inoculation, and usually died twenty-four hours later if no antibody was present in the serum tested. All surviving mice were observed for fourteen days. Controls for each day's test included the standard dilution of virus mixed with one serum which was known to neutralize more than 50 LD_{50} of virus, and a mixture of normal rabbit serum with the standard dilution of virus, and with the next lower tenfold dilution.

Serum which neutralized more than 50 LD_{50} of virus in this "screening" test was titrated, mixtures of undiluted serum with tenfold dilutions of virus being used. All results were expressed in terms of the neutralization index (*NI*):

$$NI = \frac{LD_{50} \text{ of virus in presence of test serum}}{LD_{50} \text{ of virus in presence of normal serum.}}$$

Results.

Ninety-two people aged under fifty-five years were living in Broken Hill during 1917 and 1918 and have remained there ever since, and 19 of these had neutralizing antibody to MVE virus ($NI \geqslant 20$). Twenty-five persons first came to Broken Hill between the years 1918 and 1925, and one of these possessed antibody. Sixty-nine people aged under thirty-four years were born in or had first come to Broken Hill after 1925, and two of these had antibody. The age distribution of antibody in those who were in Broken Hill during the 1917 and 1918 X-disease epidemics and those who could not have been exposed to X-disease is presented in Table I.

In September, 1951, serum was obtained from 179 residents of the Mildura-Wentworth district, an area in which eight clinical cases of MVE had occurred six to nine months previously (Anderson *et alii*, 1952). The age incidence of complement-fixing antibody to MVE virus (titre $\geqslant 5{\cdot}0$) in these sera is shown also in Table I.

From an examination of Table I and Figure I it is evident that antibody to MVE virus occurred commonly in people from both districts who were aged over thirty-four years. However, a considerably smaller proportion (two out of 69) of Broken Hill residents aged under thirty-four years had antibody, in contrast to 14 out of 122 Mildura-Wentworth residents of the same age group who were found to have antibody. The abrupt increase in the incidence of antibody in serum of Broken Hill residents aged over thirty-four years did not occur in the serum of Mildura-Wentworth residents, in whom the incidence of antibody increased steadily with increasing age.

Discussion.

Any deductions from these results must be based primarily on an acceptance of the evidence that neutralizing antibody can persist at a detectable level for periods of at

TABLE I.

Comparison of Neutralizing Antibody Content of Broken Hill Sera with Complement-fixing Antibody Content of Mildura-Wentworth Sera.

Origin of Serum.	Incidence According to Age Group (Years).							
	15 to 19.	20 to 24.	25 to 29.	30 to 34.	35 to 39.	40 to 44.	45 to 49.	50 to 54.
Broken Hill,[1] July, 1952	1[2]/15	1/38	0/14	0/2	5/27	5/23	5/22	4/20
Mildura - Wentworth[3] September, 1951 ..	4/65	2/22	3/19	5/16	8/28	5/18	1/10	2/6

[1] Results of the present survey.

[2] Numerators, number of specimens of serum having $NI \geqslant 20$, or complement-fixation titre $\geqslant 5{\cdot}0$; denominators, number of specimens examined.

[3] Results obtained by Anderson *et alii* (1952).

least thirty-five years after subclinical infection. There is sufficient evidence in regard, for instance, to the persistence of antibodies against poliomyelitis (Paul *et alii*, 1951), yellow fever (Sawyer, 1931) and Rift Valley fever (Sabin and Blumberg, 1947) to make this assumption a reasonable one.

The high incidence of neutralizing antibody to MVE virus in residents of Broken Hill aged over thirty-four years, compared with the very low incidence of antibody in younger age groups, strongly suggests that a wave of production of antibody to a virus serologically indistinguishable from MVE virus occurred about thirty-four years ago. This could have occurred in 1917 and 1918, during the time that X-disease was epidemic in Broken Hill and presumably caused a large number of subclinical infections. We therefore conclude that the virus of Australian X-disease is antigenically identical with MVE virus. This suggestion is fully in accord with epidemiological evidence obtained by Anderson and Eagle (1953), by Burnet (1952) and by Miles and Howes (1953), that the two diseases were caused by the same virus.

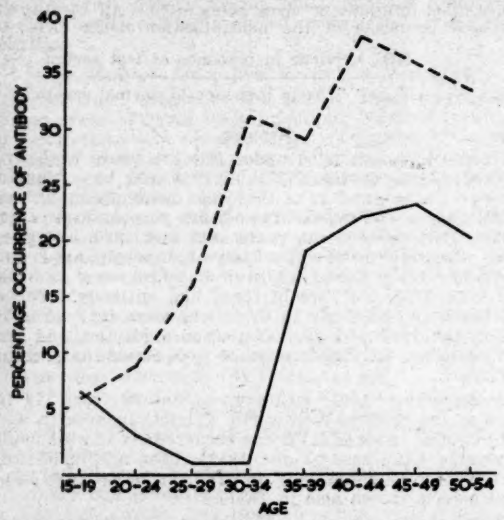

Figure I.

Comparison between age incidence of neutralizing antibody, Broken Hill, 1952 (continuous line), and complement fixing antibody, Mildura-Wentworth, 1951 (interrupted line).

We must further assume that no subsequent major opportunity for immunization occurred between 1917-1918 and 1952 in the Broken Hill area. If the 1951 epidemic had involved Broken Hill significantly, we should expect to find a proportion of positive sera similar to that found in the Mildura-Wentworth area a few months after the 1951 epidemic of MVE. When all this is taken with the fact that no clinical cases of MVE were reported from Broken Hill in 1951, we are justified in concluding that MVE virus was not present in Broken Hill during 1951.

Summary.

Nineteen out of 92 people aged under fifty-five years, who were living in Broken Hill when X-disease was epidemic in 1917 and 1918, had neutralizing antibody to MVE virus in their serum in July, 1952, whereas only two people out of 69 who could not have been exposed to X-disease had MVE antibody. The results support the hypothesis (*a*) that epidemics of Australian X-disease were caused by a virus antigenically indistinguishable from or closely related to Murray Valley encephalitis virus, and (*b*) that MVE was not present in Broken Hill during 1951.

Acknowledgements.

We are indebted to Sir Macfarlane Burnet for his advice and criticism, and to Dr. Kevin Brennan for his support in this project. We acknowledge gratefully the assistance rendered by many citizens of Broken Hill, including Mr. C. Crowley, Dr. P. Higgins, Mr. R. P. Hooper, Dr. R. J. Killalea and Mr. R. H. Nankivell.

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Reviews.

Ophthalmologic Diagnosis. By F. Herbert Haessler, M.D.; 1953. Baltimore: The Williams and Wilkins Company. Sydney: Angus and Robertson, Limited. 9" x 6¼", pp. 398, with 151 text figures. Price: 85s.

This book purports to be a road map to ophthalmology. Apart from the details, many of them interesting, one is left rather confused as to the real purpose of this volume of nearly 400 pages. For whom is it written, the trained ophthalmologist, the student of ophthalmology or the general practitioner?

For the trained oculist, while it presents some individual views of interest, it seems rather naïve and condescending; for the general practitioner it is too technical; and for the student of ophthalmology it is inadequate, though it is in this last category that the book has some merit.

The author has tried to present an attitude of mind to the study of ophthalmic diagnosis, namely, the fullest possible understanding of the disordered function in an individual patient. This is an admirable ideal, but after all, a rather elementary one for the average competent doctor. In the main body of the text the author has fallen between Scylla and Charybdis; there is too much detail for the general doctor and not enough for the whole-time specialist.

The author states that it does not seem so important to him to have the last word as to understand thoroughly the first one. This is not a highly intelligent statement, for in the light of recent researches, many traditional concepts have been seen to be inaccurate. One is reminded of the Biblical pronouncement: "But many that are first shall be last; and the last first."

The illustrations are all diagrammatic, some of them cleverly conceived, some just childish. The English is American, and the price seems rather high.

Studies in Fluid Balance: A Guide to Intravenous Therapy. By Peter S. Hetzel, M.D., B.S. (Adelaide); 1952. Published privately. 8¼" x 6", pp. 184, with 26 text figures. Price: 15s. (Available from the Institute of Medical and Veterinary Science, Adelaide.)

The main value of this monograph is the short and simply expressed review of renal physiology with its practical application of fluid and electrolyte therapy. Many practitioners, confused by this rapidly expanding subject, are discouraged from taking an interest by the lack of a small and easily readable book. Dr. Hetzel's monograph fulfils these requirements. The review is comprehensive and includes the results of recent investigatory work.

As a "Guide to Intravenous Therapy" this monograph is sound and provides a short cut to the student who has no time to delve into the literature on fluid and electrolyte metabolism. Surgical conditions receive particular attention, and although the surgeon may still delegate the responsibility of fluid therapy to his house-man or the fluid therapist, by reading this monograph he should obtain some appreciation of the disorders present in surgical conditions. Bad practices, such as the expression of electrolyte concentrations as "milligrammes per cent." instead of "milli-equivalents per litre", and too trusting reliance on the infallibility of urinary chloride estimations are condemned. Potassium is given its just due as the principal electrolyte in cell substance and not as a highly suspect therapeutic innovation.

The only criticisms which can be levelled at this book are in relation to the studies themselves. The salient features of some are obscured by detail, and as examples of certain disorders, some are not good representatives. The absence of studies of the more acute and urgent disturbances of infancy is notable, but this probably represents lack of clinical material rather than deliberate omission.

This book can be recommended to those who desire a convenient and comprehensive summary of current knowledge on fluid and electrolyte metabolism, and it should find its place in the libraries of all enlightened hospitals.

Textbook of Histology. By José F. Nonidez, D.Sc., and William F. Windle, Ph.D., Sc.D.; Second Edition; 1953. New York: Toronto and London: McGraw-Hill Book Company, Incorporated. 9″ × 6¼″, pp. 544, with 326 illustrations, composed of 214 drawings and diagrams and 233 photomicrographs. Price: $9.50.

THIS book has now appeared in its second edition after three years. The general plan is the same as that of the first edition, but new descriptive material, tables and illustrations have been added. This book belongs to the modern generation of histology books and in reading it one realizes how much the teaching of histology has improved in recent years. This is due partly to the improvements in photomicrography and other visual aids, and partly to an approach that is philosophical rather than purely descriptive, and deals with function as well as with structure. The book is clearly and interestingly written, and although it is intended primarily as a text-book for beginners, it should be quite adequate for medical and dental students. In his preface to the second edition, Windle replies to the critics who thought that the first edition of his text-book was too brief and somewhat superficial, by explaining that it is used in his lectures in combination with the projection of microscopic sections and other illustrative material such as motion pictures. He agrees with the comment of some reviewers that it would be an improvement to include coloured illustrations, but regrets that the costs were prohibitive at the time this second edition was being prepared. The 326 illustrations, which comprise some line drawings as well as photomicrographs, are, however, excellent in spite of the absence of colour. A very good feature is the explanatory comment that accompanies each item in the short lists of references which appear at the end of each chapter. For instance, when a book is referred to, the student is advised which chapters will be of most interest to him and why. The publishers as well as the authors deserve praise for the excellence of paper, type, binding and general production.

Ulcerative Colitis and its Surgical Treatment. By Bryan N. Brooke, M.Chir., F.R.C.S.; Foreword by F. A. R. Stammers, C.B.E., T.D., B.Sc., Ch.M., F.R.C.S.; 1954. Edinburgh and London: E. and S. Livingstone, Limited. 10″ × 7″, pp. 158, with many illustrations, some in colour. Price: 37s. 6d., postage 1s. abroad.

THE author distinguishes three diseases—ileo-colitis, idiopathic ulcerative colitis and procto-sigmoiditis.

He segregates right-sided colitis, or so-called ileo-colitis, by the fact that it affects the ascending colon and caecum, has characteristic radiographic appearances (the saw tooth in the Raybar progress meal), is accompanied by steatorrhœa, and has a poor result from ileostomy. Colonic resection and ileo-rectal anastomosis have not proved so satisfactory in the author's opinion for this disease, and he quotes the good results that have been obtained by vagotomy.

Procto-sigmoiditis, a mild chronic intractable inflammation of the lower part of the rectum (granular proctitis), is passed over without much helpful comment as regards both ætiology and treatment.

The greater part of the work deals with the subject of idiopathic ulcerative colitis. Not all surgeons would agree that complete removal of the colon and rectum is the operation of choice in all cases. Stress is laid on the liver damage which occurs by a long retention of the ulcerated and infected colon. Crohn's disease is described and contrasted with ulcerative colitis. The complications of the operation of colectomy are stressed, especially intestinal obstruction. Double-barrel ileostomy is favoured because of the danger of a blowout of the distal stump of ileum which might form stricture of the colon. Operative technique is described and illustrated by photographs, coloured plates and line drawings. A chapter on the management of ileostomy and its complications is well worth studying. The book is a valuable contribution to the study of the more advanced cases of ulcerative colitis in which the patient should come to surgery.

Close collaboration of physician and surgeon, careful assessment of biochemical changes and the adoption of resuscitative measures both before and after operation render surgical procedures less hazardous than formerly.

This book can be confidently recommended to both general practitioners and specialists as an up-to-date monograph on a subject which is less controversial than heretofore.

Clinical Chemical Pathology. By C. H. Gray, D.Sc., M.D., M.R.C.P., M.R.C.S., F.R.I.C.; 1953. London: Edward Arnold and Company. 7½″ × 5″, pp. 144, with 17 text figures. Price: 10s. 6d.

THIS short text on clinical chemical pathology is based on a course of lectures given to medical students. It deals with the rationale and interpretation of the commoner clinical biochemical tests. The size necessarily restricts the scope of the work.

The main subdivisions may be grouped into those concerned with tests of renal function, of fluid and electrolyte metabolism, carbohydrate metabolism, digestion and absorption. There are short chapters on tests used in endocrine diseases, and on miscellaneous tests.

In an appendix details of certain routine tests on urine and of certain special tests are given. The value of this section in such a book is doubtful. The appendix also contains a very useful table giving the normal ranges of values of blood constituents commonly estimated in clinical examinations. The principal conditions in which these values vary outside of the normal range are also given. There is a comprehensive index, and a list of selected references for further reading is given at the end of each chapter. The author has compressed much information into little space. His book will be welcome to all who use or apply biochemical tests for clinical purposes.

Clinical Disorders of the Heart Beat. By Samuel Bellet, M.D.; 1953. Philadelphia: Lea and Febiger. Sydney: Angus and Robertson. 10¾″ × 7″, pp. 376, with 164 illustrations. Price: £4 11s. 6d. from Lea and Febiger.

"CLINICAL DISORDERS OF THE HEART BEAT", by Samuel Bellet, is a clinical book written from experience gained in the wards of the Philadelphia General Hospital over twenty-five years. It is a sound and comprehensive volume divided into four sections dealing respectively with general considerations, individual arrhythmias, arrhythmias in certain clinical states (for example, syncopal attacks, infancy and childhood, rheumatic fever, thyroid disease *et cetera*) and drug therapy in arrhythmias. The first section deals with the anatomy and physiology of the heart and conducting tissue, the regulation of the heart beat, the classification of arrhythmias and general principles in diagnosis and treatment. In the second section the author discusses in detail the physiological and clinical features of the common disorders of impulse formation and their treatment. The origin of the auricular arrhythmias is discussed with particular reference to the circus movement hypothesis and the more recent views concerning their unifocal origin. The clinical features are also treated succinctly, yet critically, and in the chapter on auricular fibrillation it is good to read what is still not sufficiently realized, namely, that auricular fibrillation controlled with digitalis is not as satisfactory as normal sinus rhythm. One would agree, too, with the more liberal attitude towards quinidine in therapy. The chapter on the Wolff-Parkinson-White syndrome is also a good one, and recent views on its genesis and its potential dangers are duly documented and emphasized. The chapters on cardiac arrest and "Pronestyl" are also timely, though one might ask what is the evidence that vagal reflexes are the most important cause of cardiac arrest during surgery.

This is a good, well-balanced and well-documented book. The illustrations, chiefly of electrocardiograms, are excellent, and the volume is well produced. There are, however, many more misprints than one would expect, and "cholingeric" for "cholinergic" suggests that perhaps too

much has been delegated to the secretaries. Finally, although the physiological discussions are generally good, one feels that much that is still unknown to the physiologists has been taken as clinical fact, and that the standard of criticism falls short of that reached in the clinical sections which reflect more truly the experience of the author.

Surgery of Repair as Applied to Hand Injuries. By B. K. Rank, M.S. (Melbourne), F.R.C.S. (England), F.R.A.C.S., and A. R. Wakefield, M.S. (Melbourne), F.R.C.S. (England), F.R.A.C.S., with a foreword by Gordon Gordon-Taylor, K.B.E., C.B., LL.D., Sc.D., F.R.C.S., F.R.C.S. (Ed.), F.R.A.C.S., F.A.C.S., F.R.C.S. (Canada); 1953. Edinburgh and London: E. and S. Livingstone, Limited. 10″ x 7″, pp. 240, with 188 illustrations, one in colour. Price: 40s.

Within the framework of its carefully chosen title this book is a splendid contribution to the literature on the surgery of the hand. Among the many reasons for this are its brevity and readability. It is possible to read it right through in a relatively short time, and it is refreshing to find that no tedious irrelevant matter is included merely for the sake of completeness. It is essentially practical and obviously based on the wide experience of the authors. The methods advocated have been well tried and have been found by them to achieve the high standard which characterizes their attitude to this work. It is in no way derivative, and one is spared the vast list of references to the works of other authors. This is surely a most healthy sign. Nothing is recommended that cannot be justified in the most common-sense way.

The book is divided into five sections. The first one is general, and deals with such things as the social significance of hand injuries, surgical anatomy, organization in relation to hand injuries, and the examination of the hand. The next three sections deal with the treatment of hand injuries in the primary, intermediate and secondary phases, and these constitute the bulk of the book. This difficult subject is extensively described, but with great economy of writing. This is aided by a most useful classification of hand injuries into "tidy" and "untidy". The section on free tendon grafting is especially good, and the method of surgical approach to the tendon sheath superficial to the digital nerve and vessels is an improvement on the deep approach. It allows of a better exposure and, therefore, greater ease in making the distal junction.

Finally, the book is beautifully produced and well illustrated. No one responsible for the treatment of hand injuries should fail to read it from cover to cover, and it is clearly destined to take an authoritative place in the literature of this increasingly important subject.

Pictorial Introduction to Neurological Surgery. By G. F. Rowbotham and D. P. Hammersley; 1953. Edinburgh and London: E. and S. Livingstone, Limited. 10″ x 7½″, pp. 116, with 81 illustrations. Price: 21s.

Author and artist have collaborated to produce a small volume dealing almost exclusively with neurosurgical operative technique. The feature of the publication is its illustrations of which no less than 81 appear, the majority being composites of some six or more separate drawings portraying successive stages in the particular manœuvre under discussion. The text follows closely and, in addition, supplies useful accounts of all the emergencies commonly encountered in a neurosurgical unit.

The authors present their subject from the most elementary principles, taking their reader through accounts of posture and draping before proceeding to the methods of handling scalp and skull bones, eventually combining all into the turning of craniotomy flaps. The second part of the book is concerned with the surgery of traumatic intracranial hæmorrhage, compound wounds and their sequelæ, with a brief interlude devoted to such handling of the brain as may be found necessary during these manipulations. These accounts are easy to follow and practical, with the illustrations demonstrating every step.

Those embarking on a career in neurosurgery will appreciate this painstaking portrayal of detail and will be helped very considerably in their earlier operating days. It may also be a handy guide to the practitioner who finds himself confronted with an emergency with no trained neurosurgical help near by. It is an excellently published edition, and the only criticism that one must offer is that common to all copiously illustrated works on operative surgery—the artist's black-and-white medium makes operating appear so simple that the unwary may not anticipate the difficulties they will inevitably meet in actual practice, whilst the uninitiated may be tempted to tackle procedures which are, in fact, beyond their capacity.

Books Received.

[The mention of a book in this column does not imply that no review will appear in a subsequent issue.]

"History of the Second World War: United Kingdom Medical Series", Editor-in-Chief, Arthur S. MacNalty, K.C.B., M.A., M.D., F.R.C.P., F.R.C.S. "The Royal Naval Medical Service", Volume I, Administration, by J. L. S. Coulter, D.S.C., R.N.; 1954. London: Her Majesty's Stationery Office. 9½″ x 6½″, pp. 528, with 13 illustrations. Price: 50s.

The first of two volumes which deal with the Naval Medical Services.

"Acute Anuria: A Study Based on Renal Function Tests and Aspiration Biopsy of the Kidney", by Claus Brun; 1954. Copenhagen: Ejnar Munksgaard. 9½″ x 6½″, pp. 215, with 62 illustrations. Price: 30 Danish kroner.

Deals with every aspect of the subject.

"The Bible and Modern Medicine: A Survey of Health and Healing in the Old and New Testaments", by A. Rendle Short, M.D., F.R.C.S.; 1953. London: The Paternoster Press. 7½″ x 5″, pp. 144. Price: 6s.

One of the volumes of the "Second Thoughts Library".

"Aids to Anæsthesia", by Victor Goldman, F.F.A.R.C.S., D.A., L.R.C.P., M.R.C.S.; Third Edition; 1954. London: Baillière, Tindall and Cox. 7½″ x 4″, pp. 350, with 83 text figures. Price: 7s. 6d.

One of the "Students' Aids Series", the first volume of which appeared in 1876.

"Migraine and Periodic Headache: A Modern Approach to Successful Treatment", by Nevil Leyton, M.A. (Cantab.), M.R.C.S., L.R.C.P.; 1954. London: William Heinemann (Medical Books), Limited. 7½″ x 5″, pp. 140. Price: 12s. 6d.

"The whole object in presenting this book . . . is to refrain from confusing the reader by giving minute details of treatments. . . ." The author sets out what he calls a relatively simple method of tackling the problem.

"French's Index of Differential Diagnosis", edited by Arthur H. Douthwaite, M.D., F.R.C.P.; Seventh Edition; 1954. Bristol: John Wright and Sons, Limited. 10″ x 7″, pp. 1058, with 731 illustrations, 200 in colour. Price: 105s.

Previously edited by Herbert French, the sixth edition appeared in 1945. Douthwaite who assisted French has assumed the editorship.

"Modern Treatment Yearbook 1954: A Yearbook of Diagnosis and Treatment for the General Practitioner", edited by Cecil Wakeley, Bt., K.B.E., C.B., LL.D., M.Ch., D.Sc., F.R.C.S., F.R.S.E., F.R.S.A., F.A.C.S., F.R.A.C.S.; 1954. London: Published for The Medical Press by Baillière, Tindall and Cox, Limited. 9″ x 5½″, pp. 376, with 69 illustrations. Price: 21s.

Contains 35 articles by different authors.

"Le Service de Santé scolaire et universitaire", by Auguste Robert, with a preface by Jacques Parisot; 1954. Paris: La Technique du Livre. 9″ x 6″, pp. 630, with about 20 illustrations. Price: 750 francs.

Describes the development of the medical inspection of schools in France from 1793 to 1943.

"Annals of Medical Detection", by Berton Roueché; 1954. London: Victor Gollancz, Limited. 8″ x 5½″, pp. 226. Price: 13s. 6d.

The chapters in this book which set out stories (stated to be true) of the tracking down of diseases have appeared in the *New Yorker*.

"Good Living: A Philosophy of Health", by A. T. Todd, O.B.E., M.B., M.R.C.P.; 1953. Bristol: John Wright and Sons, Limited. London: Simpkin Marshall, Limited. 9″ x 6″, pp. 232. Price: 21s.

Written "for every man and woman who really desires health".

The Medical Journal of Australia

SATURDAY, APRIL 24, 1954.

All articles submitted for publication in this journal should be typed with double or treble spacing. Carbon copies should not be sent. Authors are requested to avoid the use of abbreviations and not to underline either words or phrases.

References to articles and books should be carefully checked. In a reference the following information should be given: surname of author, initials of author, year, full title of article, name of journal, volume, number of first page of the article. The abbreviations used for the titles of journals are those adopted by the Quarterly Cumulative Index Medicus. If a reference is made to an abstract of a paper, the name of the original journal, together with that of the journal in which the abstract has appeared, should be given with full date in each instance.

Authors who are not accustomed to preparing drawings or photographic prints for reproduction are invited to seek the advice of the Editor.

THE KINSEY REPORT.

THE book, "Sexual Behavior in the Human Female", which has become known as the Kinsey report, was published in 1953.[1] A copy was sent to this journal for review in November, 1953, but by that time the volume had received much notice in the public Press and many reviews of it had been published. It has received much notoriety in that it purports to reveal the experiences of a large number of American women who allowed themselves to be questioned in great detail about their sexual lives. The work is a serious study and has been carried out by the staff of the Institute for Sex Research of the Indiana University. Dr. Alfred C. Kinsey has had associated with him three research investigators, Wardell B. Pomeroy, Clyde E. Martin and Paul H. Gebhard. Nine other research assistants are named on the title page. This research was begun in 1938 and it has received the support of the administration of the Indiana University. It has been helped by funds from the Rockefeller Foundation, administered by the Committee for Research on Problems of Sex of the medical division of the National Research Council of the United States. The introduction to the volume is signed by two successive chairmen of the Committee for Research in Problems of Sex. In this introduction it is stated that what fifty years ago could not have been mentioned in a social group, is now spoken of without inhibition. These changes are said to be due in part to (*a*) women's progressive sexual and economic emancipation; (*b*) the all-pervasive influence of Freud's views and discoveries; and (*c*) the exposure during the World Wars of millions of American youth to cultures and peoples whose sex codes and practices differed greatly from those in which they had been reared. It is also stated that from the Kinsey project, sufficiently extended, should come basic knowledge of sexual phenomena against which theory may be checked, modified and supplemented. Emphasis should be laid on the two words "sufficiently extended" because there is a tendency to accept what is contained in the Kinsey report as if it were the final word on matters sexual in regard to the female of the species. In the first chapter of the volume it is pointed out that the present project is incorporated as the Institute for Sex Research. The Institute is the legal entity which holds title to the case histories, the library, and other material accumulated in connexion with the research. One statement on which the greatest stress should be laid is that the report "is obviously not a study of the sexual behaviour of all cultures and of all races of men. At its best, the present volume can pretend to report behavior which may be typical of no more than a portion, although probably not an inconsiderable portion, of the white females living within the boundaries of the United States". It is also stated that neither the title of the first volume on the male (this has already appeared) nor the title of this volume on the female should be taken to imply that the authors are unaware of the diversity which exists in patterns of sexual behaviour in other parts of the world. When he started on this work, Kinsey found that scientific understanding of human sexual behaviour was more poorly established than the understanding of almost any other function of the human body. There were no sufficient studies of the basic anatomy or the physiology of sexual response and of orgasm. Biologists and philosophers had confused reproductive functions with sexual behaviour and had taken for granted that the reproductive organs, and particularly the genitalia, were the only parts of the anatomy that were involved with either of these functions. Actually, it is known that none of the genital structures, even the external genitalia, are the organs chiefly concerned. In this respect, attention is drawn to the third part of the book which contains four chapters headed respectively: "Anatomy of Sexual Response and Orgasm", "Psychologic Factors in Sexual Response", "Neural Mechanisms of Sexual Response", "Hormonal Factors in Sexual Response".

The data for the study were derived from case histories secured in personal interviews. The recorded data included sexual calendars, diaries, personal correspondence, scrap book and photographic collections, artists' paintings and drawings, and other documentary material supplied by a series of the subjects. In the course of the fifteen years, 16,392 persons have contributed their histories to the study. So far, the histories of 7789 females and of 8603 males have been secured. The more general information and thinking on female sexual behaviour have been based on the entire body of material, even though the statistical analyses have been restricted to a portion of the female samples. The sexual histories of 915 white females who had served prison sentences were not included as they would have seriously distorted the calculations of the total sample. The non-white sample also (934 cases) of females was not included because it was not large enough to warrant comparisons of the subgroups in it. The statistical analyses of the present volume have therefore been based on 5940 white women who had not been in prison. In order to standardize the statistical calculations, histories acquired since January 1, 1950, have not been used. The age of the subjects

[1] "Sexual Behavior in the Human Female", by the staff of the Institute for Sex Research, Indiana University, Alfred C. Kinsey, Wardell B. Pomeroy, Clyde E. Martin, Paul H. Gebhard and others; 1953. Philadelphia and London: W. B. Saunders Company. Melbourne: W. Ramsay (Surgical), Limited. 9¼" × 6", pp. 872, with 155 text figures. Price: £3 16s.

ranged from two to ninety years. There were large and fairly adequate samples in the groups ranging from sixteen to fifty years at the time of reporting, but the younger and still older groups were inadequately represented in the sample. Educational background is considered as well as marital status and religious background. In the matter of religious background, the subjects are divided into those who were religiously devout, moderately devout and inactive. Attention is drawn to the inadequacies of the sample of persons. The generalizations reached in the volume are least likely to be applicable to the following groups: persons over fifty years of age; those with an educational level of nil to eight years; those with an educational level of nine to twelve years, especially among the persons over forty years of age; previously married females, now widowed, separated or divorced; all Catholic groups, especially among older females; devoutly Jewish groups; neighbouring groups, especially among older females; all rural groups; persons born before the year 1900; groups originating in the south-eastern quarter of the country. The occupations of the female subjects are set out in two pages with two columns in each page. The variety of occupations is noticeable; we see, for example, the occupation of acrobat, carhop, editor, judge, registered nurse, physician, prostitute, puppeteer, robber, Salvation Army officer, soda jerker, United Nations delegate, Y.W.C.A. executive and staff. All the case histories in this study were obtained through personal interviews conducted by the staff and chiefly by four of them during the period covered by the project. Personal interviews were used rather than *questionnaires* because it was thought that face-to-face interviews were better adapted for the obtaining of such personal and confidential material as appeared in a sex history. The average time required for the interview of an adult in the study was between one and a half and two hours. Sometimes over 300 questions were the minimum on the average history, but in special instances the interviews sometimes extended for 500 or more questions. The greater number of questions were required when the individual interviewed had had extensive pre-marital and extra-marital experience, or extensive homosexual experience, had used elaborate techniques in masturbation, coitus or other types of sexual activity. Clearly, the reliability and validity of reported data were much easier to assess by means of a personal interview than they would have been with the filling in of a *questionnaire*. The question of reliability and validity is discussed at some length. It is interesting that 312 females contributed sexual calendars which showed the dates on which their sexual activities had occurred. The time covered by these calendars ranged from six months to as long a period as thirty-eight years. Some scores of persons kept elaborate records of the situations and the techniques involved in sexual contacts, lists and descriptions of sexual partners, discussions of attitudes, and the social consequences of the activities.

The second part of the book deals with types of sexual activity among females. The successive chapters are headed: "Pre-adolescent Sexual Development", "Masturbation", "Nocturnal Sex Dreams", "Pre-marital Petting", "Pre-marital Coitus", "Marital Coitus", "Extra-marital Coitus", "Homosexual Response and Contacts", "Animal Contacts", "Total Sexual Outlet". It is quite impossible to enter into any detail of the information included in these chapters. In the chapter on pre-marital petting, the different techniques adopted are described. It is stated that amongst the females in the sample, petting had been significant because it had been the source of first arousal for about 34% of those individuals who had ever been aroused erotically. Among those who had made their first responses in a heterosexual situation, petting had been the first source of arousal in 51% of the cases. Petting was the first source of orgasm for about a quarter of all those females in the sample who had ever experienced orgasm. It had been the first source of orgasm attained in a heterosexual relationship for 46% of females in the sample. It was, therefore, nearly as important a first source of orgasm as all kinds of coitus combined, including pre-marital, marital and extra-marital coitus. It is stated that pre-marital petting experience provides an opportunity for the female to learn to adjust herself emotionally to various types of male—a one-eyed and therefore somewhat dangerous statement. Thus, we are told, she may acquire some wisdom in choosing the particular male with whom she hopes to make a permanent life of adjustment. It is admitted, perhaps grudgingly, that a good deal has been said about the danger of allowing a satisfactory pre-marital sexual relationship to decide the choice of a partner without due regard for the other non-sexual qualities that should be taken into account. The authors of the report have seen a few marriages get into difficulties because they were based on sexual interests alone, but they have seen many hundreds of marriages ruined by the failure of the partners to learn before marriage that they could not adjust themselves emotionally or sexually to each other. They have found no support for the view that pre-marital petting may make it difficult for the female to be satisfied with coitus in marriage. In the chapter on pre-marital coitus, it is stated that about two-thirds of the married females in the sample had experienced sexual orgasm prior to their marriage. Coitus had provided only one-sixth of the orgasms which the females had had before marriage. In the chapter on extra-marital coitus, we read that among the married females in the sample about a quarter had had extra-marital coitus by the age of forty years. Between the ages of twenty-six and fifty, something between one in six and one in ten were having extra-marital coitus. It is a statement such as this which so shocked many of the readers of the magazines in which this book has been reviewed. There is no doubt that this Kinsey report has had and will have an unfavourable effect if it is sought widely by the general public. Dr. Arnold H. Kegeo, of Los Angeles, in a letter to *The Journal of the American Medical Association* of December 5, 1953, has referred to the necessity for mitigating the impact of the Kinsey report on the public. He illustrates this by referring to a recent radio discussion on juvenile delinquency in which Judge Bernstein, of Los Angeles, stated that it had become difficult to answer delinquent girls who brazenly quoted the Kinsey report in order to justify their actions. The truth of the matter is that the Kinsey report must be regarded as a document dealing with the experience of girls and women in the community who have been willing to relate their experiences in minute detail. No one will for a moment suggest that the average woman in the community would be prepared to do this. It is, of course, possible

that some of the females who gave details of their experiences allowed their imaginations to run away with them and told some imaginary stories. The authors of the report recognize this, and it is probably correct to say that the number of such imaginings must be relatively small. There is no doubt that the modern freedom of the sexes, the ready availability of contraceptives, and the almost complete eradication of venereal diseases have had a deleterious effect on the morals of the young people of today, and evidence is not lacking to show that in certain centres the moral lapse is greater than in other places. In *The Times* of January 29, 1954, there appeared a report on illegitimacy in Oxford. A committee which had been set up by the Bishop of Dorchester to inquire into the causes of the high rate of illegitimate births at Oxford issued a report on January 28. The committee recommended a joint campaign by the churches and the Oxford City Council to educate public opinion strongly to support the integrity of marriage and family life. The committee was set up after an alderman of the City Council had stated that the number of illegitimate children born at Oxford during 1951 was 7·45% of all live births, compared with the national average of 4·9%. This fact, surely, merited some inquiry. The members of the committee considered the weakening of social and marriage sanctions and the easy availability of contraceptives; the existence of a large university population; the proximity of large military establishments, including Americans with money to spend; the considerable number of workers living in lodgings and hostels away from the security and restraint of their homes; the presence of prostitutes in the city; the inadequate number of policemen and policewomen and the shortage of houses. They thought that any increase in irregular sexual behaviour was not to be explained by any of these contributory factors alone. The committee thought that the chief cause was the growing belief that there was nothing wrong in sexual relations before marriage or in unfaithfulness after marriage. We know that in the Australian community adolescents seek methods of self-expression which, to say the least of it, are fraught with great danger to themselves. Young people are known, for example, to prevail upon their parents to absent themselves from the home while they entertain their juvenile friends with alcoholic liquors from the cellar, and in a fashion in which it may be said that what they call joy is unrestrained. It is not for one moment suggested that all these young people are licentious. Very many of them have their own codes of morality which they have built up for themselves. What the basis of the code is may not always be clear, but more often than not it seems to stand the test of tribulation. Incidentally it must be insisted that the blame for the fact that young people have to build up their own codes of morality must be laid at the feet of their parents.

Medical practitioners in Australia will be well advised to study the Kinsey report and to study it with a critical eye. Those who read it in this way will realize that sex is not the be-all and end-all of life, but that it occupies only one part of the activity of man. This statement does not imply that Kinsey and his collaborators regard their report as dealing with the whole of the activity of man and woman. Any such conclusion would be foolish. The men and women of today—perhaps it would be better if we said the young men and the young women of today—must learn to put sex in its proper place. In other words, they must learn to cultivate a true sense of values. The trouble is that humanity has lost sight of the things which really matter. It will be appropriate to conclude with a quotation from a book by the Reverend Father Victor White, O.P., "God and the Unconscious":

> Clergymen and moralists assure us that the alarming increase of divorce, the breakdown of countless homes and the prevailing misery in many more, the chaotic "Sexual Behaviour of the Modern Male" revealed in the Kinsey report: that all these are the outcome of our loss of the sense of sanctity of marriage, of sexuality and of the home. There is an undeniable but superficial sense in which that is true. But the deeper levels revealed in the analyst's consulting room show that these catastrophes are more often to be attributed to the fact that unconsciously marriage has been regarded as too sacred rather than otherwise, and hence required to bear a weight too heavy for it, and which in other days carried it. Sex is expected to provide a mystical union, the partner a divinity, the home a heaven, each in short, required to provide a substitute for religion and to be saddled with a task to which each is of its nature unequal.

Current Comment.

WHOLE BLOOD AND MUSCLE CREATINE LEVELS IN CARDIAC FAILURE.

PHOSPHOCREATINE is an essential component of the chemical reactions which produce muscle contraction. Prior to muscle contraction phosphocreatine is broken down to creatine and phosphoric acid. The recovery of muscle excitability is associated with a resynthesis of phosphocreatine. If there is a deficiency in creatine in a muscle its power to contract is diminished. Several workers have found a substantial decrease in the creatine content of skeletal and heart muscle in human beings who have died with cardiac failure, but no observations have been made on living patients with cardiac failure and other diseases. Other observers have noted a marked elevation of the whole blood creatine content in persons with failing hearts. A study of whole blood creatine content and creatine content of skeletal muscle obtained by biopsy has been made by D. C. Sutton, G. C. Sutton, G. F. Hinkens, W. B. Buckingham and R. Rondinelli.[1]

The determinations were made with the Jaffé reaction with alkaline picrate. It is recognized by the authors that a considerable proportion of the whole blood chromogen consists of substances other than creatine, but the technical difficulties of the enzymic method for estimating real creatine are very great and the figures obtained by the Jaffé method give useful information. Blood samples were obtained from the antecubital vein without a tourniquet in place. Skeletal muscle was obtained from the gastrocnemius muscle with local anæsthesia, one-gramme samples being used in duplicate estimations. Blood samples from 40 normal persons gave a mean creatine value for whole blood of 1·57 ± 0·368 milligrammes *per centum*. Muscle creatine was determined in muscle from a normal person dead four hours and gave a figure of 416 milligrammes *per centum*. For diseases other than cardiac 118 individuals with various diseases, but not anæmia, diabetes, anoxia, azotæmia or cardiac failure, were studied. The mean whole blood creatine content was 2·2 ± 0·73 milligrammes *per centum*. Muscle creatine in ten of these patients showed a mean of 282 ± 56·2 milligrammes *per centum*, well below the normal figure. A selected group of 150 cases of heart failure (Grade 4, American Heart Association) was studied prior to and during therapy. The maximum whole blood creatine content was 10·7 milligrammes, the minimum 3·0 milligrammes and the mean 5·23 ± 1·8 milli-

[1] *Am. Heart J.*, January, 1954.

grammes *per centum*. A group of 25 of these patients were studied every twenty-four hours until improvement or death occurred. With continuing improvement in the condition the blood creatine content values decreased; when there was no improvement or death occurred, the figure kept high or increased. Muscle creatine was determined in 28 patients prior to therapy. The group showed a mean of 251 milligrammes *per centum*. After successful therapy the tissue creatine rose in all cases. Administration of α-tocopherol to cardiac patients caused the muscle creatine to rise to or above normal figures and the whole blood creatine content to fall, but there was no apparent clinical effect. To summarize the results in the cases of cardiac failure, the elevation of blood creatine values in heart failure bore a relation to the degree of decompensation. Decreasing values indicated improvement, while stationary, high and increasing values indicated severe cardiac failure, often impending death. On this basis the authors suggest that serial levels may be of prognostic value. These are, of course, whole blood figures.

STROKES.

As a cause of disability, illness and death, vascular disease of the brain has few rivals. Moreover, effective treatment for it has in general been lacking. In pointing this out, Miller Fisher[1] confesses that when it was suggested to him several years ago that he should undertake a neuropathological study of the effect of high blood pressure on the brain, he was under the impression that the subject of cerebro-vascular disease had already been well cut and dried by the pioneers of neuropathology. However, as the study progressed, it became apparent that this was far from true, and there was unfortunately little interest in the subject. As a result of a broad clinico-pathological study of the subject, aimed finally at unravelling the therapeutic problems involved, Fisher has produced a comprehensive account of cerebral vascular disease under the simple title of "Concerning Strokes". He introduces it with a brief description of the cerebral circulation and then goes on to state that, although many different disease entities can result in strokes, the immediate pathological substrate usually can be resolved into one or other of the three well-known vascular processes: embolism, hæmorrhage and thrombosis. These occur with about equal frequency. The clinical picture is highly variable, depending upon the type, size, site and speed of progress of the lesion.

With cerebral embolism, the embolic material is usually a piece of thrombus or clot, but it may be a portion of valvular vegetation, air, fat, bone marrow, tumour cells, atheromatous material or parasites. Embolus due to thrombus or blood clot is the commonest, and often originates in the appendage of a fibrillating left auricle; another common source is mural thrombus deposited on a region of myocardial infarction, and sometimes emboli arise from mural thrombus deposited on atherosclerotic ulceration of the ascending part of the thoracic aorta or large vessels of the neck. Metastatic abscesses or secondary bronchogenic carcinoma of the brain may arise from the venous bed of the lungs. Again, in many cases, although the diagnosis of cerebral embolism seems beyond doubt, no source of the embolus can be found after careful search; this is true at all ages, but particularly in the twenty to forty years age group. Cerebral emboli may be small or large, and the resultant infarct may involve an entire cerebral hemisphere or be so small that only a few millimetres of a convolution are destroyed. Infarcts due to embolus may be pale or hæmorrhagic. Infected emboli from vegetations in subacute bacterial endocarditis may give rise to mycotic aneurysms, ordinary infarcts or septic infarcts with or without secondary hæmorrhage. The clinical picture of cerebral embolism depends upon such factors as the part of the brain affected and the size of the embolus. Usually there is a hemiplegia of variable severity and duration, but there need not be gross paralysis. Other commonly associated features are paræsthesiæ, aphasia, dementia, confusion, dizziness, hemianopsia and blindness. An important feature is the sudden onset of the symptoms, usually within ten to thirty seconds. No minor prodromal warning occurs, and there is usually a likely source of embolus or evidence of emboli elsewhere in the body. The cerebral symptoms may be very transient, and a wrong diagnosis of vasospasm may be made.

Cerebral hæmorrhage can be primary, as in hypertension, or secondary to one of several conditions, including trauma, septic embolism and bleeding from a saccular aneurysm, mycotic aneurysm, arterio-venous aneurysm and hæmangioma. Hæmorrhage may also result from excessive doses of anticoagulants and from thrombocytopenia or any other illness characterized by a bleeding tendency. Severe hemiplegia is rarely due to trauma, but hæmorrhage into a primary or secondary tumour of the brain is not uncommon. Primary intracerebral hæmorrhage is always a manifestation of high blood pressure and should not be diagnosed in the absence of hypertension. Intracerebral hæmorrhage generally occurs while the patient is awake, and a stroke coming on during sleep is rarely due to hæmorrhage. The onset of the full clinical picture may be sudden, but usually is not, and the paralysis gradually worsens over a period of several minutes, an hour or occasionally a day; this is a reflection of the size of the arterial leak and its proximity to important cerebral pathways. Prodromal warnings are rare, and the neck is not stiff in the early stages, but becomes so later unless the patient is in deep coma. Fisher recommends that in primary intracerebral hæmorrhage, lumbar puncture be delayed for a week or so, when the presence of xanthochromia from seepage of blood pigment into the ventricular or subarachnoid spaces is diagnostic. The prognosis in cerebral hæmorrhage is poor, both for survival and for recovery from the paralysis. A transient stroke with prompt recovery is most unlikely to be due to an intracerebral hæmorrhage. Rupture of a berry aneurysm is not uncommon, and almost all such aneurysms are situated on the anterior half of the circle of Willis. The clinical picture of a ruptured berry aneurysm can be most variable, but the syndrome of temporary unconsciousness followed by severe headache and little or no paralysis is quite specific for the lesion. Usually the first hæmorrhage is not fatal, but in at least 50% of cases recurrent episodes of bleeding with fatal outcome follow in days or weeks. An act of exertion often is a precipitating factor. After rupture occurs, the neck is always stiff, and the cerebro-spinal fluid is always grossly bloody. In these cases hypertension is not requisite, and in most instances of aneurysm the blood pressure is normal. Atherosclerosis may or may not be present. There is now a growing tendency to treat ruptured berry aneurysms surgically, whether by the means of direct approach or by ligation of the carotid artery.

Cerebral thrombosis has several underlying causes, but the great majority of cases have atherosclerosis as the pathological basis. Atherosclerosis is a focal disease in cerebral arteries, showing a predilection for certain points in the vascular tree, namely, branchings, bifurcations and bends. Cerebral thrombosis is prone to occur during sleep or during the hypotensive interval after hæmorrhage or myocardial infarction. Prodromal symptoms are common, and the clinical picture may take hours or days to develop fully. Thrombosis of the large vessels at the base of the brain is not as frequent as cerebral embolism and hæmorrhage. Hypertension itself does not lead to closure of cerebral vessels, but atherosclerosis is the basic factor. The clinical picture of cerebral thrombosis covers a broad spectrum of signs and symptoms, but the most important single factor pointing to the diagnosis is a history of prodromal transient episodes preceding the final arrival of the stroke. No other type of stroke is associated with warning symptoms except rupture of a berry aneurysm. Primary hæmorrhage and embolism always strike without preliminary manifestations. However, thrombosis does not always produce transient warnings, and this is especially true in hypertensives. Another important characteristic of thrombosis, sometimes met with, is the

[1] *Canad. M. A. J.*, September, 1953.

development of neurological symptoms over a period of several days; this is in contrast with embolism, in which the onset is abrupt, and with hæmorrhage, in which the onset is a matter of minutes or hours. As the hemiplegia develops in cases of thrombosis, the fractions of paralysis are added from time to time in stuttering staccato fashion, rather than in the smooth progression characteristic of brain tumour, subdural hæmatoma or brain abscess. A smooth gradual onset of hemiplegia is never due to thrombosis. Another point in favour of thrombosis is its tendency to come on during sleep or during periods of abnormally low blood pressure. Cerebral hæmorrhage is prone to occur during waking hours and not during sleep or shock. Cerebral embolism may occur as well in sleep as in waking. In the early stages of a stroke, the nature of the onset and the intimate details of prodromal symptoms are of prime importance in making a diagnosis. Transient warning attacks, often called vasospasm, are extremely common in cases of cerebral thrombosis, and many such examples have now been verified pathologically. Transient phenomena consist of hemiparesis, paræsthesia, dysphagia, dizziness, diplopia, central blindness, monocular blindness, headache, vomiting, weakness of the legs, loss of memory, confusion and dementia. The fleeting prodromal attacks may be frequent or few, and may precede the final stroke by months, weeks, days or hours. Anticoagulant medication has to be considered, but any likely benefit must be weighed against the possible dangers of such therapy, and Fisher considers that at present this form of treatment should be avoided in the presence of severe hypertension. Of course, the prevention of cerebral thrombosis will depend ultimately on the prevention of atherosclerosis itself, a much larger and even more vital problem of great topical concern.

THYROTROPIN IN THE DIAGNOSIS OF OBSCURE HYPOTHYROIDISM.

THE diagnosis of fully developed myxœdema is relatively simple, but there are many persons in whom a question of hypothyroidism arises, but the clinical picture and usual tests of thyroid function are not sufficiently characteristic to establish a diagnosis. By the injection of a single small dose of thyrotropin and two oral doses of I^{131} (radioactive iodine), W. McK. Jefferies, R. P. Levey, W. G. Palmer, J. P. Storaasli and L. W. Kelly[1] have developed a test for use in the diagnosis of obscure hypothyroidism which is simple for those who have the necessary equipment. On the first day, at 9 a.m., a tracer dose of I^{131}, without added carrier, was given orally with the subject in a fasting state. Three hours later the uptake of iodine was measured with the counter over the thyroid gland, correction being made for background activity as determined by counts made over the lower part of the thigh. Immediately after this a single injection of 10 milligrammes of a fairly pure preparation of thyrotropin was administered intramuscularly. On the next day, twenty-four hours after the administration of the first tracer, residual thyroid radioactivity was counted, and a second tracer, containing the same dose of radioactivity as the first, was given orally in the fasting state. Three hours later measurement of the thyroid uptake was again made. The effect of the thyrotropin was evaluated by the difference between the three-hour uptakes of the tracer doses.

In normal persons examined the uptake after the thyrotropin was about twice that after the first dose of tracer. In patients in whom the diagnosis of primary hypothyroidism had already been established, the initial uptakes were much lower than those of normal subjects, and thyrotropin had no effect in any case. In one case of hypothyroidism secondary to pituitary insufficiency there was a low initial uptake, but the response to thyrotropin was normal. Thyroid administration in hypothyroidism raised the initial reaction, but there was no response to thyrotropin. Thirty-seven patients with suspected hypothyroidism were examined. The majority of the subjects reacted like normal controls and the symptoms could therefore not be attributed to hypothyroidism. Four patients had a low initial uptake with no response to thyrotropin, verifying the impression of hypothyroidism. Five subjects had an initial three-hour uptake within the normal range, but failed to respond appreciably to thyrotropin stimulation, suggesting a low thyroid reserve. An interesting case was that of a nine-year-old girl who had been receiving thyroid because of a diagnosis of cretinism. At the age of five years she developed a goitre and thyroid medication was stopped, but symptoms of cretinism reappeared, so thyroid was again given. In the test her initial three-hour uptake was more than twice as high as that seen in any normal subject and this increased further after thyrotropin was given. There was no defect in the ability of the thyroid to trap iodine, but apparently the gland could not utilize it to form thyroid hormone. The protein-bound iodine of the blood serum was determined before and after thyrotropin administration. This was low initially and did not rise appreciably after thyrotropin. This type of patient has been described by others. The test has been found to be both safe and practical.

[1] *New England J. Med.*, November 26, 1953.

THE DOCTOR'S WORKING WEEK.

MOST private practitioners in Australia work hard, and no doubt they will be pleased to know that their colleagues in the United States do the same—some to the tune of over ninety hours per week. Others manage less than ten hours per week, but the figure for more than half of a large group of private practitioners is given as sixty hours or more. This information, which is quoted by H. A. Rusk, H. S. Diehl, R. W. Barclay and P. K. Kaetzel,[1] was revealed in a survey of more than 55,000 practitioners which was carried out in 1950 jointly by the United States Department of Commerce and the American Medical Association. The private practitioners made up 30,000 of the 55,000. The length of the working week was closely related to the age of the practitioners. For those sixty-five years of age and older it averaged less than half that of those aged thirty-five to forty years. Those aged fifty-five to sixty-four years had an average working week roughly three-quarters as long as those aged thirty-five to forty-four years. This influence of age on the working week was much the same for both general practitioners and full-time specialists. Another important factor was the doctor-population ratio. More than half the doctors lived in the "better staffed" States, where the doctor-population ratio was 100 or more per 100,000; they worked an average of just under fifty-five hours per week and received an average net annual income of $10,600. For those in "poorer staffed" States the corresponding figures were over sixty hours per week and $12,000 *per annum*. Full-time specialists in private practice averaged fewer working hours per week and a greater annual income than general practitioners, but in two particular specialties (pædiatrics and obstetrics and gynæcology) the average working week exceeded that of the general practitioner. It may be noted that full specialists in cities of 25,000 to 500,000 people had longer working weeks than those in smaller or in larger communities. For general practitioners, the working week was longest in rural communities, shortening with increase in the size of the city.

Apart from the working hours question, certain points about specialization are of sufficient interest to warrant mention. It appears that the proportion of specialists has more than tripled in the past thirty years, and this upward trend is continuing. Moreover, the average age of specialists in 1949 was approximately two and a half years less than that of the general practitioners. Among the various specialties there was a difference in average age of as much as eight and eight-tenths years. The specialty with the lowest average age was the relatively new and rapidly expanding field of anæsthesia.

[1] *New England J. Med.*, October 22, 1953.

Abstracts from Medical Literature.

PATHOLOGY.

Systemic Nodular Panniculitis.

Bernhard Steinberg (*Am. J. Path.*, November-December, 1953) describes a systemic disorder, hitherto unrecognized. The condition, known as relapsing non-suppurative nodular panniculitis, or Weber-Christian's disease, had been thought to be confined to the panniculus. Data in this presentation indicate the existence of a systemic disease in which there is involvement of the thoracic, abdominal, perivisceral and intravisceral adipose tissue. The abnormal changes in the fatty tissue are similar to those observed in the panniculus. Focal necrosis of the liver and spleen has been found in some of the patients. Involvement of fatty bone marrow results in interference with the hæmatopoietic activity and consequent confusion in the diagnosis of blood dyscrasias. Invasion of the lymph nodes, the spleen and the liver with fat-laden histiocytes produces an enlargement of these organs. The large number of histiocytes, especially in the lymph nodes, has been confused with neoplasia, and systemic panniculitis should be considered in the differential diagnosis of lymphomata. It is suggested that the term for localized lesion of the panniculus be simplified to subcutaneous nodular panniculitis. Since the condition is known now in the literature as panniculitis, it would be well to retain the name for the systemic disorder. Although panniculitis refers to the subcutaneous adipose tissue, it is suggested that because of previous usage the term systemic panniculitis be used.

The Lymphatic Spread of Gastric Cancer.

D. A. Sunderland, G. McNeer, L. G. Ortega and L. S. Pearce (*Cancer*, September, 1953) have studied the distribution of lymph-node metastasis of primary cancer of the stomach in 41 cleared surgical specimens comprising the stomach, greater and lesser omenta, body and tail of the pancreas, and spleen. Metastasis to lymph nodes was found in 85% of the specimens. Cancers of the proximal segment of the stomach had metastasized chiefly to superior gastric, paracardial and pancreatico-lienal lymph nodes. Those of the distal segment had metastasized chiefly to superior gastric, sub-pyloric and inferior gastric nodes. Cancers arising in the middle segment and those occupying most of the stomach had metastasized to lymph nodes of all zones with more equal regularity. Pancreatico-lienal nodes had been involved by metastases in 51% of the series and in 81% of all cancers of the proximal segment that had metastasized at all. The authors state that metastasis to these lymph nodes does not seem to have been significantly influenced by gross adhesion of the stomach to the pancreas or by direct invasion of the pancreas by cancer. More lymph-node metastases were found in specimens in which cancer arose in the proximal or middle segment than in those in which it arose in the distal segment; the most were found when the cancer involved the entire stomach. The depth of invasion of the cancer through the gastric wall seemed to have a considerable influence on the extent of lymph-node metastasis. There was also a relationship between the number of lymph nodes involved by metastasis and the microscopic type, the extent of gross intramural infiltration and the size of the cancer.

Histiocytosis X.

Louis Lichtenstein (*Arch. Path.*, July, 1953) reviews the subject of histiocytosis X, covering especially the period from 1944 to date, and attempts a comprehensive reorientation on the basis of significant recent observations. He states that these have lent additional strong support to the concept that the conditions previously designated eosinophilic granuloma of bone, "Letterer-Siwe disease" and "Schüller-Christian disease" are interrelated manifestations of a single malady. The name "histiocytosis X" is suggested as a provisional broad general designation for this nosological entity. The recognized types of clinical involvement can be grouped under this general heading and still be differentiated from one another, so that useful distinctions having a bearing on treatment and prognosis are maintained.

The Thyroid in Addison's Disease.

J. C. Sloper (*J. Path. & Bact.*, July, 1953) describes the pathology of the thyroid in 21 cases of Addison's disease from a necropsy series of 37 cases. In nine thyroids there were conspicuous involutional changes associated with slight focal parenchymatous hyperplasia. Seven of these nine thyroids occurred in subjects with "toxic" atrophy of the adrenals. The author states that the association is probably not coincidental, for few abnormal thyroids have been encountered in Addison's disease of tuberculous origin. Thyroid atrophy was severe in two cases; in the remainder the surviving parenchyma was compatible with normal function. The tendency to involution probably reflected hypopituitarism. The parenchymatous hyperplasia may have been compensatory, or due to the diminished secretion of the thyroid-inhibitory adrenocortical hormone.

Regeneration of Tendon.

R. C. Buck (*J. Path. & Bact.*, July, 1953) has studied regeneration of the divided Achilles tendon by histological and histochemical methods in rats under conditions of normal muscle pull and reduced muscle pull. In addition, regeneration has been followed in scorbutic guinea-pigs, in a control group and in a group recovering from scurvy. Fine strands of fibrin, which from an early stage connect the divided ends of the tendon, are considered to be "spun out" by the action of muscle pull and to have an important orientating influence on the fibroblasts which grow into the defect. The surrounding connective tissue gives origin to the cells of the replacement tendon. New cells in the tendon stumps probably arise from those of the *peritenoneum internum*. Mature tendon cells are believed to be relatively incapable of dividing. In the early stages at least, the elongated shape of the cells does not reflect a direct adaptation to the force of muscle pull. More likely it is a manifestation of the growth of the cells along solid surfaces—fibrin, pre-existing fibrous connective tissue, paratenon and the cut ends of the tendon. The thickness of the new tendon is proportional to the magnitude of muscle pull. However, although reduced muscle pull results in the production of a thin replacement tendon, the histological character of this tissue is not adversely affected. The persistence of a metachromatic ground substance in regenerating tendon probably represents the continued production of the "teno-mucoid" of normal tendon. In the rat, although not in the guinea-pig, alkaline phosphatase activity is associated with the production of collagen fibres for a longer period than in healing skin wounds. Cartilage and true bone almost invariably develop in the regenerating rat tendon at the points of junction with the old stumps. This change may represent a metaplasia of the fibroblasts of these particular locations, since these cells differ in their arrangement from those of the remainder of the regenerating tendon.

Rhabdomyosarcoma of the Vulva and Vagina.

W. B. Ober, R. E. Palmer and F. J. Glassy (*Arch. Path.*, October, 1953) describe two cases of rhabdomyosarcoma, one of the vulva and the other of the vagina. Previously reported cases of sarcoma in this region are reviewed and evaluated. The origin and meaning of the terms rhabdomyoblast and rhabdomyosarcoma are discussed. The authors state that although the prefix "rhabdo-" is thought to imply the presence of cross striations, these are not the most constant or diagnostic features of this muscle tumour, and the etymology from the Greek word ῥάβδος does not support the concept of transverse striation. The relation of these tumours to other sarcomata of the female genital tract is discussed. The authors state that rhabdomyosarcomata in this region are usually heterologous tumours. They may occur in "pure" form or be present as one component in a "mixed" tumour.

The Pathological Anatomy of Simple Pneumonokoniosis in Coal Workers.

A. G. Heppleston (*J. Path. & Bact.*, July, 1953) has investigated by means of the serial-section technique the anatomy of the respiratory portion of the bronchial tree and the structure of the dust lesion which characterizes simple pneumonokoniosis in coal workers. He states that between the terminal (non-respiratory) bronchiole and the alveolar duct there are generally three orders of respiratory bronchioles. Branching of the respiratory portion of the bronchial tree occurs irregularly. The simple dust lesion of coal workers takes the form of a sheath of dust cells, enmeshed in fine fibrous tissue, surrounding the respiratory bronchioles. The proximal limit of this sheath is regularly in the region of the division of the terminal bronchiole, but distally the dust investment extends for a variable distance up to the division of the final order of respiratory bronchioles, depending on the degree of dust accumulation. The early lesion of coal workers closely resembles the dust focus often found in normal lungs. In mature dust lesions the ensheathed bronchioles dilate, and this change is known as focal emphysema. No evidence was found to support the claim that focal emphysema results from a proximal obstruction of

the air passages by dust fibrosis. On the contrary, simple narrowing of a terminal bronchiole induces neither dilatation nor collapse of distal segments of the airway. Generalized vesicular emphysema is distinct from focal emphysema. It is characterized by dilatation of alveolar ducts, atria and alveolar sacs. Rupture of alveolar walls does not occur, but in the formation of bullæ localized areas of lung tissue are destroyed. The focal and the generalized varieties of emphysema may coexist. Small tension cysts of the lung, unlike focal emphysema, result from a valvular type of obstruction to expiration. The anatomical findings show that dyspnœa in simple pneumonokoniosis is due to an increase of the dead space in the dilated respiratory bronchioles. There is thus a functional obstruction to gaseous exchange, but no anatomical obstruction in the air passages.

MORPHOLOGY.

Relationship Between Bile Capillaries and Sinusoid Walls.

Y. EDLUND AND V. HANZON (*Acta anatom.*, Vol. 17, 1953) demonstrate the histological relationship between the sinusoid wall, liver cell and bile capillary in clinical material and in normal rats. They state that it has been established that the intercellular branches of the bile capillaries may extend all the way to the sinusoid wall. Thus, in these areas blood and bile are merely separated by a thin membrane.

The Cerebral Aqueduct.

D. H. M. WOOLLAM AND J. W. MILLEN (*Brain*, March, 1953) have examined the cerebral aqueduct by means of sections and reconstructions in 14 normal human brains. They state that it has been found that the incidence of hydrocephalus was about one in 1500 births and that at least one-third of the cases of this condition was due to developmental abnormalities causing obstruction to the flow of cerebro-spinal fluid, and half of them arose in the aqueduct. The present investigation provides detailed information on the anatomy of the aqueduct and normal variations in its dimensions, information which has hitherto not been available. The bearing of this information upon the subject of hydrocephalus is discussed.

Arterial Supply to Inferior Cervical Sympathetic Ganglion.

E. L. PATTERSON (*J. Anat.*, July, 1953) mentions the confusion regarding identification of the inferior cervical sympathetic ganglion, and reexamines the matter; in those cases in which it remains separate from the first thoracic nerve, he identifies it both by its position posterior to the vertebral artery and by its *rami communicantes* to the seventh and eighth cervical nerves. He states that the only constant source of blood supply to the stellate ganglion is the superior intercostal artery, the nutrient vessels arising either directly or from its posterior rami and muscular branches passing behind the ganglion. There is nearly always at least one accessory supply from other arteries in the vicinity, such as the costo-cervical trunk, deep cervical, thyro-cervical trunk and first aortic intercostal, and less frequently the subclavian and the internal mammary arteries, the latter through a branch to the *ansa subclavia*. A notable exception is the vertebral artery, which has not been seen taking part. There are free anastomoses between the ganglionic arteries both on the surface of the ganglion and within it; also between these vessels and those of the middle cervical and second thoracic ganglia. From an anatomical point of view the blood supply to the ganglion appears to be very well assured.

An Hypothalamic Interpretation of History.

W. R. BETT (*Bull. Hist. Med.*, March, 1953) states that there is much to interest the hypothalamic specialist in the medical case-records of some of the heroic figures in history, and discusses two in particular, namely, Alexander the Great and Napoleon. Alexander exhibited the state of hypersomnia and uncontrollable fits of rage, both hypothalamic symptoms, and Napoleon had fits probably due to a disturbed anterior pituitary lobe function, associated with transient spontaneous hypoglycæmia. His paroxysms of tears, his attacks of fury, his shining Olympian heights, his deep Plutonian darknesses may be interpreted in terms of temporary derangement of the adrenals and the thyroid—nervous defence mechanisms mediating through the hypothalamus.

Human Premaxillary Bone.

C. R. NOBACK AND M. L. MOSS (*Am. J. Phys. Anthropol.*, June, 1953) state that two schools exist concerning the fate of the premaxillary bone in man. One view holds that the maxillary bone overgrows the ectofacial aspect of the premaxillary bone, while the contrary view claims that the maxillary bone and premaxillary bone fuse ectofacially at the incisive suture. The authors state that the premaxillary bone and maxillary bone of man fuse at the ectofacial surface. This concept is supported by direct observations made on human fœtuses aged six to nine weeks —the age during which the suture is obliterated. Data from the literature and original observations are presented. The authors state that because a terminological confusion is present in some of the literature, it is essential to distinguish between the contribution of connective tissue processes and the osseous processes in this region. The maxillary bone does not overgrow the ectofacial surface of the premaxillary bone. The overgrowth thesis is based on observations of fœtuses over nine weeks old—ages after which the incisive suture has been obliterated. No direct observations demonstrating the overgrowth have been presented in the literature.

Order of Eruption of Teeth in Hominoids.

E. M. B. CLEMENTS AND S. ZUCKERMAN (*Am. J. Phys. Anthropol.*, September, 1953) state that a clear-cut pattern of phylogenetic change is discernible in the sequence of eruption of the teeth of primates, and particularly in that of the permanent teeth. In what is believed to be the most primitive arrangement, the first, second and third permanent molars appear in rapid succession before any deciduous teeth are lost. The deciduous incisors are then replaced by permanent ones; permanent premolars take the place of the deciduous molars; and the canines, the last teeth of the permanent set, then emerge. This sequence occurs in the tree shrews, whereas in the majority of prosimians and in a few monkeys, the permanent incisors appear before the third molars, which precede the premolars and permanent canines. In most monkeys and in all the anthropoid apes, the third molar does not appear until the permanent premolars have erupted, while the second molar does not erupt until the permanent incisors are in place. In man the permanent canines frequently precede the premolars, which in turn usually precede the second molars. It was found that the lower first molar had erupted first in 27 of 93 children with only one permanent tooth erupted; the upper and lower first molar teeth were seen together in 45% of children with only two permanent teeth erupted. This variable picture contrasts with that seen in the great apes, in which the lower first molar always erupts first, and is invariably followed by the corresponding upper tooth. The lower incisor tooth erupts before the upper one in about two out of three apes, whereas the lower almost invariably appears first in man. The sequence of dental eruption in modern man is very variable. It is therefore possible that variations attributable to random sampling may account for certain of the apparently aberrant dental patterns seen in the skulls of fossil man and in existing primitive peoples.

Relative Thickness of Bones.

A. H. SCHULTZ (*Am. J. Phys. Anthropol.*, September, 1953) finds that the absolute thickness of the long bones of the limbs is closely dependent upon the load they have to support; but a gain in body weight is followed by a much smaller relative increase in bone girth, as is to be theoretically expected and has here been metrically demonstrated. A change in limb length does not primarily affect the absolute thickness of the limb bones, hence the girth-length indices become greater with a decrease in limb length and smaller with an increase in limb length, provided body weight remains practically unchanged. In all his girth-length indices man falls well within the range of variations of the corresponding indices among the other primates, but in his girth-trunk indices man is distinguished by the highest of all values for tibia and fibula combined with the second highest value for femur, undoubtedly on account of his bipedal locomotion. Sex differences in the relative thickness of the limb bones favour males in all forms for which suitable material was available, the difference being particularly great in types with great sex differences in body size. During post-natal growth the limb bones become more slender, but in relation to trunk height the bone girths increase in man. The thickness of the vertebræ, measured as transverse diameter and expressed as percentage of the trunk height, is greater in all the higher primates than in any of the monkeys. Man is distinguished among all recent primates by having the proportionately thickest vertebræ, particularly in the lumbar region. Even the much heavier male gorillas do not equal man in relative thickness of lumbar vertebræ. This human specialization represents an adaptation to the upright posture and to the mechanical requirements of a true perpendicular column of vertebræ.

British Medical Association News.

SCIENTIFIC.

A meeting of the New South Wales Branch of the British Medical Association was held on October 24, 1953, at the Fireside Inn, Goulburn, Dr. T. Y. Nelson, the President-Elect, in the chair.

Renal Tract Infections.

Dr. S. R. Reader read a paper entitled "Renal Tract Infection" (see page 631).

Dr. C. W. G. Lee read a paper entitled "Infections of the Urinary Tract in Infancy and Childhood" (see page 634).

Dr. L. D. Wheeler read a paper entitled "Renal Tract Infections: The Urological Point of View" (see page 635).

Dr. G. A. W. Johnston read a paper in which he discussed renal tract infections from the point of view of the clinical pathologist.

Dr. E. B. Docker, in opening the discussion, referred to the statement made by the speakers that many patients who suffered from pyelitis had parenchymal involvement. He said that everyone would agree that there was not much clinical evidence; but if the supposition was accepted, he would like to hear some discussion on how such patients were to be treated. At the present time, for example, a woman suffering from pyelitis was treated with sulphonamides for five or six days; she went home to look after the children and do the washing, and in most cases she recovered. Such a patient was also likely to have pyelonephritis going on to hypertension and so forth; therefore it seemed better to admit her to hospital for ten days and give her massive doses of sulphadiazine and perhaps antibiotics. Dr. Docker also wondered what was to be done for patients with chronic pyuria, when no abnormality was found after investigation, and the antibiotics did not produce a cure.

Dr. R. J. Hoy said that he had two questions to ask. The first concerned what seemed to be a relatively common condition in general practice amongst young women who had from time to time symptoms referred to as those of cystitis—urgency, pain and frequency of micturition, sometimes with the necessity to pass urine every few minutes; the urine was loaded with pus and sometimes blood, but there was no fever or backache or evidence of higher renal tract involvement. The condition cleared up in a few days with treatment, and nothing further happened until next time. The attack seemed to occur mostly during the pre-menstrual week or during pregnancy, and apparently its occurrence was precipitated by the intake of alcohol, even in small amounts. After the attack had cleared up it was impossible to find any pus in the urine or grow any microorganisms, and a complete cystoscopic examination with retrograde ureterography and a full examination of the pelvis revealed no abnormality. In one case during an attack a cystoscopic examination revealed diffuse inflammation of the bladder. The attacks seemed to continue for years, and there was nothing to do but treat each individual attack. Dr. Hoy said that he presumed that the condition would lay the patient open to parenchymal renal involvement with all its hazards in later life, and he asked what the cause was. He wondered whether it might be hormonal in origin. He also asked what could be done about it. The second question he had to ask concerned chronic prostatitis in the middle-aged man with epididymitis and sometimes orchitis. The organisms usually involved were Proteus or *Pseudomonas pyocyanea* sensitive to chloramphenicol, but pus was still present even when the symptoms cleared up. Arsenicals given intravenously had no effect either. Dr. Hoy asked whether in such cases the proper procedure was to perform a prostatectomy or tie the vasa.

Dr. E. F. Thomson referred first to what Dr. Reader had said about the dosage of antibiotics; he said that if he had understood Dr. Reader's table correctly, the dosage of all four (streptomycin, chloramphenicol, aureomycin and "Terramycin") was put down at two grammes a day. The makers of aureomycin and the makers of "Terramycin" now recommended a dosage of one gramme per day, one capsule at a time. It was stated that if two capsules of either antibiotic were given together, only one would be absorbed and the other would be excreted. Dr. Thomson thought that if the makers recommended such a dosage, it must be correct. He asked Dr. Reader to qualify his statements about dosage. Possibly the same thing applied to chloramphenicol. Dr. Thomson said that he had been interested in Dr. Wheeler's remarks. Dr. Reader had said that most urinary tract infections would recover with sulphonamide treatment and Dr. Wheeler had agreed with him; yet many urologists insisted on using chloramphenicol. He asked Dr. Wheeler to comment on that question. Dr. Thomson said that he had had a discussion with Dr. Werner from New York; Dr. Werner, as well as being director of the foreign supply department of Pfizer and Company, was a physician on the staff of one of the New York hospitals. Dr. Thomson had asked him about polymyxin B sulphate, which was effective against *P. pyocyanea*. On the label put out by the makers, it was stated that the antibiotic was to be used only in hospitals because of its nephrotoxic and neurotoxic effect. Dr. Werner had said that it was very good in urinary tract infections if used in doses of 2·5 milligrammes per kilogram of body weight once or twice daily. Dr. Thomson said that he himself still thought that it was very dangerous, and must be handled very carefully. Dr. Thomson went on to say that he had been interested in Dr. Lee's figures on the incidence of infecting organisms, which were not much different from Dr. Reader's figures, and asked Dr. Lee to state the precise dosage of chloramphenicol for children. The dosage seemed to be higher than that used. Referring to organisms found in urine, Dr. Thomson said that in drawing up any table of organisms every attempt should be made to cut out contaminants. He asked Dr. Johnston how one was to know that the organism isolated was the infecting organism. In metropolitan hospitals, the responsibility for collecting specimens of urine seemed to be put on to the night nurses, who were as a rule very junior people. Dr. Thomson believed that no bacteriological examination should be carried out on any specimen of urine except a catheter specimen, whether the patient was male or female. Another problem was whether microscopic examination of urine should be carried out on the centrifuged deposit or not. Urologists would not allow pathologists to centrifuge urine, and would not accept examination of the centrifuged deposit. Dr. Johnston had referred to the isolation of the tubercle bacillus; Dr. Thomson agreed with the remarks and said that he had given up the examination of twenty-four-hour specimens and preferred to examine an early morning specimen after restriction of the patient's fluid intake. Dr. Thomson asked Dr. Johnston to define when a leucocyte became a pus cell in the urine. Dr. Johnston had said that final year students could not examine urine. Dr. Thomson said that that was true; it was due to the teaching, which was his responsibility, and which was bad because the numbers of students were so great that insufficient time was available to take them two at a time, and give them adequate instruction. Referring to the question of the presence of blood in urine, Dr. Thomson asked Dr. Johnston if he took urine from 20 normal people and examined it, in how many specimens he would find red blood cells without doing an Addis count. On the question of acid-fast bacilli not being able to be grown after treatment of the patient with isoniazid, PAS or streptomycin, Dr. Thomson asked what would happen if a specimen of sputum or urine from such a patient was inoculated into a guinea-pig.

Dr. J. H. Coles asked what was the ætiological connexion between naso-pharyngeal infections and recurrent pyelitis in children.

Dr. B. W. Monahan asked if any of the speakers had had experience with "Urolucosil".

Dr. G. C. Halliday asked Dr. Reader to amplify his remarks about the ætiology of so-called hæmatogenous infection. Dr. Halliday wondered why the *Bacillus coli communis* should attack the renal tract and not some other organ, when, as had been said, ascending infection played a very small part in renal tract infections except in very young children.

Dr. L. H. McCaffery referred to the question of dosage of chloramphenicol. He said that a dosage of 50 to 100 milligrammes per kilogram of body weight became a real problem, especially with a large man, and especially when treatment went on for some weeks, as in cases of brucellosis, and patients were mentally and physically refractory to further therapy after ten or twelve days.

Dr. K. C. T. Rawle referred to Dr. Johnston's recommendations about the centrifuging of specimens of urine. He asked whether the remarks applied to the laboratories at the large teaching hospitals, or whether all medical practitioners should buy expensive and cumbersome apparatus. Was there any advantage to be gained? Dr. Rawle said that he himself could manage to make a microscopic examination of urine in exactly ten seconds, with the help of his trained staff. Every specimen of urine that went through his office was examined in that way. If the general practitioner examined centrifuged deposits, he would find

some leucocytes, and some red cells in a mass, which they had been told were normal findings. He himself did not particularly want to find them that way. By his own microscopic examination of the urine he could find enough organisms, pus cells, red cells *et cetera* to give a diagnosis.

Dr. Nelson, from the chair, said that the papers had been very instructive, and had covered a wide field. The importance of infection of the urinary tract had been stressed by the various speakers, the importance of diagnosis had been shown, and Dr. Johnston had shown that there were many simple tests within the competence of every general practitioner; it was not necessary to have full laboratory facilities. Stress had also been laid on the importance of adequate treatment, and a multitude of pathological conditions had been mentioned. Dr. Nelson said that from his point of view, he felt that the whole meeting would have been worth while had one only of the points mentioned by Dr. Wheeler been stressed—the importance of double ureters. However, not much had been said about the symptoms of ectopic ureter, which was an important and remediable cause of "enuresis". It was not so uncommon as they used to think. Gross in his latest book cited eight cases at the Boston Children's Hospital over an unstated period of years; at the Royal Alexandra Hospital for Children they had had five cases in the last twelve months. It was a question of taking an accurate and careful history. Often the condition was not recognized until adult life. Many affected children had a reversal of the usual manifestations, being incontinent of urine during the day and "dry" at night. Such children were labelled enuretics; but if the cause was an ectopic ureter, they were mostly curable.

Dr. Reader, in reply to Dr. Docker, said that when a patient did not recover after treatment with all the antibiotics, the situation was terribly difficult. One had to be sure that the antibiotic therapy was efficient before it was given up. If the temperature had fallen temporarily, only to rise again, it was necessary to exploit the drug further by giving an increased dosage. If that was done and the patient did not respond and no surgical condition could be demonstrated, all one could do was to keep on with antibiotics and symptomatic measures and hope that the patient would eventually work out his own salvation. Referring to the dosage of "Terramycin", Dr. Reader said that the figures in the slide were from a paper written before the dosage mentioned by Dr. Thomson was published. In reply to Dr. McCaffery, Dr. Reader said that one could begin with a dose of chloramphenicol of one gramme per day. The organism should have been proved to be sensitive to that antibiotic before it was given. If the patient did not respond, the dosage could be increased; if the patient still did not respond, a sulphonamide could be given in addition, and so on. In reply to Dr. Thomson's question addressed to Dr. Johnston, and in reply to Dr. Rawle, Dr. Reader said that of course urine should be centrifuged for microscopic examination. But a standard practice should be adopted by the medical practitioner, who should centrifuge the specimen for a given time at a given rate and resuspend in a given volume. In reply to the question about red cells in normal urine, Dr. Reader said that if one examined 20 specimens of urine from normal people, one should not find any red cells in them. If any were found, they should be considered abnormal until subsequent examinations showed them to be transient. In reply to Dr. Halliday, Dr. Reader said that he did not know why, if the infection was hæmatogenous, it stopped in the kidney and not somewhere else. But perhaps if was because the kidney was an excreting organ and bacteria were excreted by it. Also predisposing factors in the form of obstruction or congenital abnormality might favour infection.

Dr. Lee, in reply, referred first to the dosage of chloramphenicol in children. He said that recently they had been using it in higher dosage than aureomycin, 50 to 100 milligrammes per day according to the type and severity of the infection. There seemed to be good evidence that in some infections the higher dosage was necessary. For severe infections the dose was between 100 and 200 milligrammes per kilogram of body weight; certainly that was so in meningitis. In reply to Dr. Coles, Dr. Lee said that in many cases pyelitis did complicate upper respiratory tract infections. There also appeared to be an association between gastro-intestinal infections and pyelonephritis.

Dr. Wheeler, in reply, said that Dr. Docker had mentioned the case of chronic pyuria in which no abnormality was found on complete investigation, and Dr. Hoy had mentioned the case in which there was a completely anatomically clear urinary tract in males and females. These cases presented a tremendous problem. In male subjects it was essential to rule out chronic prostatitis, and in females chronic cervicitis, vaginal infections and urethral diverticula, the last-mentioned being not uncommon. In female patients most cases were due to chronic cervicitis. If cervicitis was present and mild erosions were treated adequately, perhaps with diathermy or surgery, sometimes the attacks did clear up. If they did not, what was one to do? Sometimes good results were obtained by the use of a maintenance dose of sulphonamides (one tablet three times a day for months) for both male and female patients; children were given a smaller dosage. All the antibiotics had been tried, and sometimes even they were without effect. There could be salvage of some patients by the finding of lesions such as skenitis *et cetera*. It was important to clear up even the most minimal genital tract infections. It was sometimes a help to clear up minor degrees of prolapse, because they were associated with minor degrees of obstruction. On the question of male patients with chronic prostatitis producing recurrent epididymo-orchitis, Dr. Wheeler said that if all else failed, there was a definite argument for division of the vasa, because the patient was almost certainly already sterile. However, the patient had to make the decision, and occasionally he would consent to the operation. All those infections were ascending—in other words, from prostate and seminal vesicles to the epididymus. Prostatectomy seemed to have no indication, because vasectomy was a much simpler procedure, and in most of those cases the enucleation of hyperplastic prostatic tissue was out of the question. Some of these patients had only a small fibrous prostate. Certainly such cases were extremely difficult; even when all investigations had been carried out, there remained patients for whom not much could be done. Dr. Wheeler said that urologists preferred the examination of an uncentrifuged specimen of urine, probably because it seemed to give all the necessary information as well as being easy. Perhaps from the hospital point of view both uncentrifuged and centrifuged specimens should be looked at. Dr. Wheeler said that sulphadiazine seemed to be the most useful sulphonamide of them all, and in urinary tract infections it was not necessary to worry too much about crystalluria or anuria, because the patients usually had an adequate fluid intake, not like the patient with something like tonsillitis causing difficulty in swallowing. If sulphonamide anuria should occur, it could be relieved (almost always) by ureteric catheterization.

Dr. Johnston, in reply to Dr. Thomson, said he agreed that specimens of urine from the female patient for bacteriological examination should always be collected by catheter. On the other hand, when bacteriological examination of urine from male patients was required, he doubted whether routine catheterization was justified except in special circumstances. Even catheter specimens were subject to contamination by the bacterial flora of the urinary meatus. In his opinion a mid-stream specimen collected under supervision was satisfactory. In answer to Dr. Rawle's question about the microscopic examination of an uncentrifuged specimen, Dr. Johnston thought that this was perhaps better than nothing as it occasionally revealed a gross abnormality, but it was not enough. Allowing the urine to stand and taking a drop of the sediment for microscopic examination was a practice he did not recommend. During standing, contaminants such as yeasts and bacteria multiplied, cells and casts disintegrated and crystals separated out, so that the microscopic picture often became unnecessarily confused and might present a problem even for the expert. The advantage of examining freshly passed specimens was therefore obvious. Dr. Johnston recommended the electric centrifuge to all practitioners. He said that makes were available which took up remarkably little bench space. On the question of terminology raised by Dr. Thomson, Dr. Johnston said that there was no actual dividing line between a pus cell and a polymorphonuclear leucocyte. The presence of pus cells meant inflammation. It was the practice of some laboratories to report pus cells as leucocytes. Referring to the training of students, Dr. Johnston agreed with Dr. Thomson that the only satisfactory way to teach students to examine urinary deposits would be to give them expert instruction in the laboratory—preferably in very small groups. In the past that had not always been practicable. On the question of examination of urinary deposits from a number of healthy males, Dr. Johnston said that occasional red cells and epithelial and pus cells would be seen. According to Addis the normal output of red cells in a twenty-four-hour specimen of urine was anything up to 750,000 cubic millimetres. Dr. Thomson had asked what would happen if material which was smear-positive and culture-negative for acid-fast bacilli was injected into a guinea-pig. Dr. Johnston said that he was not quite sure. He pointed out that one was not justified in drawing hard and fast conclusions about the viability of acid-fast bacilli based on results of routine cultures.

Medical Societies.

NATIONAL ASSOCIATION FOR THE PREVENTION OF TUBERCULOSIS IN AUSTRALIA: LAENNEC SOCIETY.

A CLINICAL meeting of the Laennec Society was held at the Royal North Shore Hospital of Sydney, Crow's Nest, on December 7, 1953. About 70 members and guests attended.

Staphylococcal Pneumonia.

DR. BRUCE WHITE described two cases of staphylococcal pneumonia, both of which had occurred in young women. Both patients had had similar symptoms and signs. The disease had been confined to the upper lobe of the right lung in each case, and the radiological appearances in both were almost identical. In each there was a negative response to the Mantoux test.

In the first patient, the response to penicillin had been excellent, the acute phase of the disease gradually subsiding within seven days, and resolution of the inflammatory process, as shown by serial skiagrams, appeared to be complete within one month.

In the second patient, there was scarcely any improvement with penicillin, but when aureomycin was administered similar satisfactory changes occurred, and again about one month later skiagrams of the chest showed complete disappearance of the acute exudative infiltration.

Dr. White said that the value of the Mantoux test was well illustrated in the cases described, because radiological opinions had been given that the skiagrams represented tuberculous disease. He thought that the value of the Mantoux test from an epidemiological point of view was being increasingly accepted, but it was still not used sufficiently to help in difficult cases from the diagnostic point of view. The occurrence of staphylococcal lung infection associated with influenza, asthma and other preexistent pulmonary lesions was not uncommon. Clarification of thought on the subject had in recent years been largely due to Brock. But in his writings on the subject it was of interest to note the tributes paid by Brock to others for very accurate descriptions of this type of lung infection—for example, to Chickering and Park in 1919, and to Ryle in 1930. Dr. White pointed out that prior to the use of the "sulpha" drugs and more recently the antibiotic drugs, the mortality in such cases had been invariably described as high. In former days staphylococcal infections of the lung associated with influenzal epidemics were frequently fatal, the patient being overwhelmed by a staphylococcal septicæmia in a few days. In such cases there was not the "typical" pathological change as noted in the serial skiagrams of the cases described at the meeting. In those cases in which a favourable result ensued, there might be left the so-called "honeycombing" or larger spaces resembling bullæ or even large cysts. But similar changes might, of course, follow many inflammatory preliminary episodes, either specific or non-specific.

Cavernous Pulmonary Telangiectasis.

DR. A. G. MCMANIS discussed a case of cavernous pulmonary telangiectasis. The patient was a woman, aged forty-seven years, who had undergone X-ray examination of her chest in August, 1950, because she had a pain in the chest. Actually she had had an attack of *herpes zoster*, and the pain was a post-herpetic neuralgia, but it was thought that it might be due to pulmonary disease. The X-ray examination revealed a lesion in the lower part of the right lung. Another X-ray film taken in October, 1950, showed no change, and no further action was taken. In September, 1952, a routine X-ray examination was made, which again revealed the lesion. Further investigations revealed a positive Mantoux test result, sputum free from acid-fast bacilli and no lesion visible at bronchoscopy. Subsequent X-ray examinations showed the lesion to be unchanged.

In March, 1953, she was referred to Dr. Ian Monk at the Royal North Shore Hospital of Sydney. When she attended it was noted that she had a slightly dusky appearance, and that there were telangiectases on face, lips, palate and tongue. There was slight clubbing of the fingers, and a continuous murmur could be heard in the right axilla; it was loud on full inspiration, and could not be heard on expiration. The posterior-anterior X-ray film appearances had not changed, and the right lateral view showed opacities in the anterior segment of the upper lobe of the right lung and in the anterior basal segment of the lower lobe of the right lung. The blood count showed 5,600,000 erythrocytes per cubic millimetre, with 16·2 grammes *per centum* of hæmoglobin. An anterior-posterior tomogram was taken of both lungs to see whether there were more than the two lesions seen in the lateral view. This showed that there were no lesions in the left lung, and on the right side showed large vessels coursing to and from the lesion. A right lateral tomogram confirmed that there was one lesion present in the anterior segment of the upper lobe and another in the anterior basal segment of the lower lobe.

On questioning the patient it was elicited that her father had had similar spots on his face, and had suffered from nose bleeds, as she had herself. He had died in the Royal North Shore Hospital some ten years previously, and the records revealed that he had had renal failure. However, there was the report of an X-ray film which described a peculiar opacity in the chest, considered at that time to be a secondary deposit. At the autopsy a lesion was discovered in the lung, which was said to be a blood cyst. There could be little doubt that the father also had had a cavernous pulmonary telangiectasis of the lung.

On November 18 a thoracotomy was performed by Dr. Monk. At operation a large volume of blood could be seen being shunted through the two lesions, which presented on the surface of the lung. It was also noted that the lesions decreased in size on expiration. The vascular lesions were dissected out of the lungs, and scarcely any pulmonary tissue was removed. The patient made a satisfactory recovery from the operation, and was discharged from hospital on December 8.

Plastic Operations for Post-Tuberculous Stricture of the Bronchus.

DR. IAN MONK discussed cases illustrating plastic operations for post-tuberculous stricture of the bronchus. He said that when active tuberculous infection of the bronchus healed, fibrosis occurred, and that often resulted in narrowing of the bronchus to such a degree that partial, or even complete, mechanical obstruction followed. That might be segmental or lobar, or involve the whole lung. The effects of such an obstruction were (*a*) atelectasis, which might be permanent or recurrent, (*b*) recurrent episodes of infection, which might be non-specific and result in bronchiectasis, and (*c*) occasionally obstructive emphysema. Clinically the symptoms might be out of all proportion to the changes seen radiographically. Troublesome cough, sufficient to interfere with sleep, sputum, often purulent and increased during episodes of infection, wheeze or stridor, and dyspnœa were all symptoms which might trouble the patient. When the obstructing stricture was partial (as it nearly always was), the physical sign of wheeze or stridor could be elicited.

Dr. Monk said that the relief of a mechanical obstruction was one of the oldest functions of surgery. Experiences of the last decade had shown that the bronchus had great powers of healing and of holding sutures. That period had also seen advances in the development of "replacement" surgery, in that tissues from other parts of the body had been transplanted successfully to act as a framework and become incorporated in the grafted organ. The first to apply those principles successfully to human patients in the lungs had been Belsey, of England, in 1946. He had excised an obstructing tumour in the trachea and replaced the defect with *fascia lata*. Later Paul Gebauer, of Honolulu, had applied the principles to bronchi which were the seat of fibrous strictures resulting from previous tuberculous disease.

Finally, the very survival of many of the patients affected could be attributed solely to the discovery of the antibiotics, as was their successful surgical management.

Dr. Monk then presented a group of patients as illustrating some of these principles. The first patient, a married woman, aged twenty-eight years, was a patient of Dr. Bruce White. She had been discovered to be suffering from tuberculosis in December, 1949. Her X-ray film was virtually normal, but extensive tuberculous bronchitis was observed involving the lower part of the trachea and the right main bronchus, with tuberculous granulations almost obstructing the left main bronchus. With streptomycin therapy the bronchial tree healed except that a fibrous stricture remained which involved the length of the left main bronchus. The opening to the left lung, as seen bronchoscopically, was judged to be three or four millimetres in diameter. A bronchogram subsequently showed that this degree of narrowing was present to just above the upper lobe bronchus of the left lung. Her progress following the healing of the tuberculous bronchitis was one of recurrent disability. Extension of the disease was noted in the upper lobe of the left lung; recurrent episodes of atelectasis occurred in the left lung, with troublesome cough and wheeze. After a great deal of thought and discussion it was decided to attempt an operation designed to remove the diseased upper lobe and conserve the

apparently normal lower lobe. In May, 1953, a left upper lobectomy was performed, the left main bronchus and adjacent part of the trachea was opened to a length of six centimetres, and a previously prepared dermal graft "laced" with 28-gauge stainless steel wire was sewn into this defect. At the conclusion of the operation a small apical thoracoplasty was performed. Her post-operative course gave rise to no real concern, although some difficulty was experienced in raising sputum. Three weeks after operation a bronchoscopy was performed, and glairy, thick, mucoid material was removed, partly by suction and partly with biopsy forceps. It was thought that some of this material was degenerate matter from the graft. The patient's subsequent progress had been satisfactory, in that she was satisfied with the relief given; although on forced expiration a wheeze could be elicited, or occurred when there was any increase in sputum, as with a cold. That, however, could be cleared readily by a few coughs.

The second patient, a married woman, aged thirty-three years, was a patient of Dr. Bruce White. She had had tuberculosis for many years, for which a right artificial pneumothorax had been maintained for five years. In 1950 cough and wheeze had become troublesome, and bronchoscopy revealed almost complete obstruction of the right lung level with the carina. Not only did the patient have very distressing cough and wheeze, but she had recurrent bouts of fever with exacerbation of cough and purulent sputum. Further investigation revealed that the stricture was localized, being only a few millimetres in length. Attempts were made to dilate this stricture with no success; so the patient was admitted to hospital for operation. Because bilateral scattered disease was present, it was felt that she would not stand a right pneumonectomy and that only the stricture should be relieved. On admission to hospital she was ill with cough, purulent sputum was being raised, and opacities were present in both lower lung lobes. It was hoped that the opacities were non-specific in nature, and after preparation of some weeks with antibiotics, operation was undertaken. In July, 1953, a right thoracotomy was performed, and the area involved between the upper lobe of the right lung and the lower part of the trachea was resected. The right main bronchus was then anastomosed to the lower end of the trachea. Post-operatively the patient was troubled by breathlessness of severe degree due to the aspiration of blood during operation, but after that period was passed she had continued to improve. Striking symptomatic relief had occurred, with quite surprising improvement in the parenchymal shadows seen in the X-ray film.

The third patient, a single woman, aged twenty-seven years, had been found to have tuberculosis in 1946, and for it a left artificial pneumothorax was maintained for three years. In October, 1951, cough and left-sided wheeze developed. In addition to a "cap" of what was considered to be thickened pleura left after the pneumothorax, the upper lobe of the left lung became atelectatic. Bronchoscopy revealed a localized stricture at the junction of the upper and lower lobes. At that time pneumonectomy was considered, but was thought to be too radical. With further experience of the surgery of bronchial strictures and persistence of the disability, operation was decided on. In July, 1953, resection of an apical empyema and the upper lobe of the left lung was performed. The stump of the upper lobe bronchus was bisected to include the resection of a wedge of bronchus containing the stricture. The upper, remaining part of the upper lobe bronchus was then sutured to the lower lobe bronchus, so that an excess of tissue replaced the defect left after excision of the stricture. The subsequent course was uneventful.

The fourth patient, a married woman, aged thirty-two years, was a patient of Dr. Cotter Harvey. In 1952 she had suffered an acute, apparently infective respiratory illness. An X-ray examination of the chest showed a small calcified lesion in the upper lobe of the left lung. About one year later a further attack occurred of what was thought to be acute bronchitis. An X-ray examination of the chest revealed a small area suggestive of tuberculosis. The sputum was found to contain tubercle bacilli. The patient was examined by Dr. Harvey, who referred her for bronchoscopy. The findings were similar to those in the first patient, in that nearly all the left main bronchus was narrowed to a diameter of about four centimetres. Although the X-ray film showed little disease, the patient was very troubled by cough and what she described as a wheeze in the upper part of the left side of the chest. Even with quiet respiration extra-auscultatory stridor could be heard. It was proposed to submit the patient to a thoracotomy when the extent of the disease could be judged. In addition to any resection that might be necessary, arrangements would be made to place a dermal graft, or to resect the area of stricture and reanastomose the bronchus.

Dr. Monk said that the anæsthetic management of the patients discussed presented special problems in each case. Dr. Brian O'Shea was the anæsthetist in both.

Pulmonary Tuberculosis in Children.

To illustrate pulmonary tuberculosis causing serious disability or prolonged illness in children other than infants, DR. BRUCE GEDDES showed five patients.

The first patient, a girl, aged three years, had been originally examined as a contact in December, 1950; she was tuberculin-negative and her chest X-ray film was normal. She was to attend for B.C.G. vaccination, but failed to do so because, it was subsequently learned, she had developed a prolonged febrile illness with cough and enlarged axillary glands. When she was seen again, ten months after her first attendance, she was tuberculin-positive and her X-ray film showed a shadow of segmental distribution in the upper lobe of the right lung. She was treated with streptomycin and PAS for three months, and, as she was clinically well and her X-ray appearances were improving, returned to school.

Six months later, however, she suddenly developed a wheeze and, shortly after, a right-sided pleural effusion together with an unstable segmental shadow in the upper lobe of the right lung. She was admitted to hospital and twice submitted to bronchoscopy. No perforation was seen, but the carina was widened, and on both occasions pale granulation tissue, almost blocking the right stem bronchus, was removed. No tubercle bacilli could be found in her sputum. Her wheeze and pleural effusion rapidly disappeared, but her X-ray shadow resolved only slowly. Six months later, again being clinically quite well, she returned to school. A month later she was readmitted to hospital with pain in her back, and soon frank tuberculosis of the thoracic part of the spine became apparent. Her chest lesion had gradually cleared, but treatment of her vertebral disease continued nine months after its appearance and nearly three years after her primary infection.

The second patient, also a girl, aged three years, had been admitted to hospital in February, 1952, with a history of cough and fever for five weeks, together with a rash, which was diagnosed first as measles, then as *erythema nodosum*. Her Mantoux test result had been found to be positive, and an X-ray examination of her mother's chest revealed pulmonary tuberculosis. The child's X-ray film showed enlarged mediastinal glands and a right lower lobe shadow distinct from that in the mediastinum. She was given streptomycin, and improved clinically, lost her symptoms and went to a sanatorium. There she remained well until February, 1953, when her cough returned. Serial X-ray films showed but little resolution of the mediastinal masses or the parenchymal shadow. She had at that time an inconstant wheeze to the right of the sternum, and streptomycin therapy was recommenced. Three months later the lower lobe of the right lung and two nodules from the middle lobe were removed, together with extensive enlarged glands from the mediastinum, one of which so intimately surrounded the lower lobe artery that none of that lobe could be saved. Examination of the glands showed caseous tuberculosis, as did a mass measuring three by two by two centimetres situated in the apex of the lower lobe. Convalescence was uneventful, and the child was now well.

The third patient, a girl, aged seven years, had been admitted to hospital in May, 1952, with a history of "failure to thrive" and frequent colds. X-ray examination showed left upper lobe infiltration, and tomograms revealed a cavity. She was Mantoux-positive, and her sputum contained tubercle bacilli. Her mother's X-ray film also revealed tuberculosis. The patient was treated with streptomycin and PAS, and later a left upper lobe lobectomy was performed. The lobe contained scattered caseous foci, and a cavity and enlarged glands were present along the pulmonary artery. Those, however, were not apparently affecting the upper lobe bronchus, nor was there any bronchoscopic abnormality. Her convalescence was uneventful, and she had now returned to normal school life.

The fourth patient, a boy, aged eleven years, had been first examined as a contact in November, 1952. He was tuberculin-positive and well. His X-ray film showed flecks of calcification in the right hilar region. Three months later he developed an acute febrile illness, and he was admitted to the Royal North Shore Hospital of Syndey a few days later, having dveloped a pleural effusion on the right side. The fluid had the characteristics of a tuberculous effusion. He was given streptomycin and in all spent six months in hospital before returning to his home.

The last patient, a girl, aged thirteen years, had become ill with fever and cough in March, 1953. Her physician examined her sputum and found acid-fast bacilli in May,

1953, and she was admitted to hospital. She was Mantoux-positive and had numerous tubercle bacilli in her sputum, and her X-ray film showed left upper and mid-zone infiltration and a large cavity beneath the left clavicle, together with infiltration in the lower lobe of the right lung. She was still in hospital and had shown considerable improvement.

Dr. Geddes said that, whilst the potentially serious nature of tuberculous infection in infants was widely known, the fact that older children might suffer serious disability was perhaps not so generally appreciated, possibly because the mortality in the older age group was so relatively low. That did not mean, however, that the morbidity was negligible, or that pulmonary tuberculosis in children did not, in certain selected cases, justify even surgical treatment. Every tuberculous lesion in a child's lung should be treated no less seriously and with no less respect than those occurring in adults, for children could develop tuberculosis of the lungs exactly similar to that in adults, and, to quote Dillwyn Thomas, "primary tuberculosis is not always a benign disease".

Dr. M. P. Susman presented details of an unusual case of adenoma of the bronchus. It is intended to report this case separately later.

Out of the Past.

In this column will be published from time to time extracts, taken from medical journals, newspapers, official and historical records, diaries and so on, dealing with events connected with the early medical history of Australia.

MEDICINE A SCIENCE, NOT A TRADE.[1]

The scientific physician must do his own work and not the instrument maker or mechanic. Medicine is strictly a science, but if artful mechanism is to supersede its utility and expansion then it must drift into a state not much better than a mere trade of buying and selling. Where the most goods are exposed there generally the greatest amount of business will be done; and so with the profession—the physician who can array the greatest stock and variety of instruments claims on this principle the preference of being considered the most skilful and enlightened practitioner. So long as he manipulates his instruments, so long will he command vulgar and ignorant applause, should he never devote one moment's solitary consideration to the origin, cause and nature of the disease.

Correspondence.

THE FELLOWSHIP OF CHRISTIAN HEALING.

Sir: The report in your issue of March 20, 1954, of the meeting of the Fellowship of Christian Healing, held in Melbourne, made quite interesting reading. I think, however, that official recognition of any group of men working with doctors, as an ancillary arm of the profession in the realm of so-called spiritual healing, is fraught with dangerous sequelæ both for the profession and for the sick.

The whole history of medicine bears unequivocal testimony to the fact that, while the practice of medicine was carried on under the sway of belief in the supernatural cause of disease, the art of healing never progressed.

In the year 460 B.C. was born the greatest physician of all time—Hippocrates. St. Luke subscribed to the casting out of devils, but Hippocrates showed that there was no such entity as a devil which could either be born in or enter a human being, and, therefore, there could be no such thing as casting one out.

The conquest of Greece by the Romans, completed by about the year 146 B.C., was a most important episode in ushering in the Dark Ages, because the Romans were more interested in superstitions than the truths that Hippocrates enunciated, with the result that the Hippocratic teachings went into a long sleep, out of which they were eventually awakened by the stirrings of the Renaissance in the middle of the fifteenth century. During most of that long period of time, however, the Christian Church was wielding to the full the whole armamentarium of spiritual healing, and the result was that medical science suffered an almost complete eclipse, and mankind secured virtually no relief from disease. In the face of this experimental proof of the failure of the healing art in the hands of theologians, it would surely turn out to be an unholy alliance, paradoxical as it may sound, for the medical profession to enter into with theologians for the alleviation of suffering.

To give chaplains, or any other group, a bastard course in medicine would be the first step towards creating an army of quacks with an official backing, which would inevitably lead to further suffering, for, without a sound foundation, no medical superstructure of any value can ever be built.

Whatever plans there may or may not be for mankind, it is certainly not one that healing shall be brought about by incantations, phylacteries, amulets, holy relics or any other of the paraphernalia of ecclesiastical medicine.

It is not true that doctors rely entirely on physical measures and scientific methods; not a few of us have been the instruments of "miracles" just as striking as many described in the New Testament. Were an untrained man, however, to have such an experience, he would interpret it as the signal that he was specially selected by God for such work and would blossom out as another faith-healer, to the furtherance of more suffering to the multitudes, who would be attracted to him by his ballyhoo, false claims and alleged "divine" calling.

Christ came to save the souls, and not the bodies, of men. He taught neither science nor medicine and probably knew little about either. He used no scientific methods, and neither education nor learning is necessary to understand His message.

Yours, etc.,

Burwood, Walter J. Hull,
New South Wales,
April 7, 1954.

CORONARY DISEASE AND THE LAW.

Sir: In the recent excellent articles on "Heart Disease in Industry" in your issue of February 13 there is no reference to what has come to be known in legal circles as the Forst Case (*Commonwealth Law Reports*, 1940-1941, 64: 538). This was the case of a man, aged sixty-three years, who, after two efforts of rather strenuous work, the first in an awkward position, without any obvious signs of distress walked about twelve yards and then collapsed and died. At the post-mortem examination a clot, which extended into an atheromatous patch, was found blocking the anterior coronary artery. The widow claimed compensation under the *Workmen's Compensation Act*, 1932-1935 (South Australia). The Arbitrator found that "'death from coronary thrombosis cannot generally be related to exertion, but that death in such cases is a mere happening in the chronological order of things. If death does occur concurrently with or closely connected in point of time with exertion by Forst, I am unable . . . to connect the two in such a way as to say that exertion caused the death. . . . In other words, merely because shortly before his death Forst was exerting himself and shortly afterwards died of coronary thrombosis does not cause me to reach the conclusion that the exertion had anything to do with his death'.

"The Supreme Court, to which an appeal lay as well upon matters of fact as upon matters of law (Act, sec. 41), reached a different conclusion. 'We agree', said the learned judges, 'that . . . it must be difficult and probably impossible to relate an attack of coronary thrombosis to any particular activity of the patient and we concede that even in this case it is difficult to feel any great confidence in the inference but it seems to us that we have here the coincidence of strenuous physical exertion occurring at or about the time when the thrombosis must have commenced to precipitate. If the expert evidence shows, as we think it does, that physical effort is commonly—although not invariably—the inciting cause of the phenomenon, we think that we are entitled to draw the inference that "a medical witness" felt unable to draw. We fully accept his view that the evidence is in some measure inconclusive. For the purpose of a scientific deduction it may be insufficient, but we repeat that courts of justice are entitled and bound to act upon the probabilities of the case'."

The evidence of the medical witness referred to is the following: "It is my opinion that the final clot formed

[1] From "Typhoid Fever, Its Pathology and Treatment, Based on Rational Physiological Principles", Sydney, 1873, by Andrew Ross, M.D., medical practitioner, of Molong, New South Wales.

after he came down from the crane. I think that as soon as the clot formed he would be unable to do anything. I can't see any special connection between the work done and the formation of the clot. At first sign one would naturally be inclined to associate any unusual effort with the fatal result. That is, I would. I would try and see some reasonable association between the two but in the case of thrombosis in the coronary artery one's previous experiences being taken into consideration one fails to see an association that appeals to one as being right." This opinion was backed by a number of examples showing the circumstances under which sudden deaths from coronary disease had occurred. (See also my paper "Cardiac Infarction and Coronary Disease in General in Post-Mortem Examinations", M. J. Australia, 1949, 2: 733.) An appeal to the High Court upheld the decision of the Supreme Court, three judges concurring, Dixon J. dissenting. In my opinion, the Arbitrator's decision was the correct one, and the grounds for this are clearly set out by the dissenting judge.

This decision of the High Court has established a precedent for similar cases. How can it be revoked without long and (to the client) expensive and uncertain court proceedings? May I suggest that the British Medical Association might well take up this and other debatable matters affecting medicine and the law? For instance:

1. A medical witness, instead of giving oral evidence, might (or must) present a written one, that is, a carefully considered statement on which he can be cross-examined. I have re-read the medical evidence as printed in the Forst case and find much of it rather obscure; the judges must have had great difficulty in understanding it. The jury could have understood little.
2. It is a ridiculous position that the widow of an elderly man, who might die at any time from coronary disease for instance, and must die soon, should get compensation if he dies at work and none if he dies at home.
3. We want to keep the elderly employed in their own interest for health reasons. How can employers be expected to employ them if they are liable to pay compensation if they die whilst being employed, however fantastic the association with their work may be?
4. In cases of death clearly due to the work, the expectation of life should be considered in assessing the amount.
5. A clear statement as to the relationship of coronary disease to effort.
6. The use of a medical arbitrator to sit in court and help the judge to assess the medical evidence.
7. The relationship of various diseases to war service.

Yours, etc.,

J. B. Cleland.

Adelaide,
April 5, 1954.

Obituary.

EDGAR HORATIO MILNER STEPHEN.

We are indebted to Dr. P. L. Hipsley for the following appreciation of the late Dr. Edgar Horatio Milner Stephen.

With the death of Dr. Edgar Horatio Milner Stephen recently, Sydney lost one of its best citizens and the medical profession one of its most distinguished and colourful personalities. Edgar Stephen was seventy-five years of age at the time of his death. He attended the Sydney Grammar School for his early education, and graduated bachelor of medicine from the University of Sydney in 1902. He was a resident medical officer of the then Prince Alfred Hospital in 1903, and of the Sydney Hospital for Sick Children (as it was then called) in 1904. In 1905 he went to London and became a house physician of the Brompton Hospital for Diseases of the Chest. On returning to Sydney he entered into partnership with Dr. P. Wood, of Ashfield, and like most doctors at that time did his rounds for a year or two with horse and sulky. After about ten years of this partnership his practice had grown so much that he asked Dr. T. Y. Nelson to assist him in his work, and he and Dr. Nelson carried out their portion of the practice from rooms in Dr. Stephen's home in Holden Street, Ashfield. When the 1914-1918 war broke out, he enlisted with the Australian Imperial Force, in which he served from 1915 to 1919; at first with the Sixth Field Ambulance, and later on with the Australian General Hospital, Rouen, France. Early in 1918, as Major Edgar Stephen, he was appointed a medical specialist member of the medical board whose duty it was to assess the fitness of recruits as flying officers. This board worked at Australian Imperial Force Headquarters, Horseferry Road, London. On his return to Australia he helped in the examination of candidates for civil aviation and continued to do this work for about twenty years. It was whilst he was in France that he met his future wife, Miss Whiteman, who was then an army sister, and they were married in London before returning to Australia.

In 1909 he was appointed to the staff of the Royal Alexandra Hospital for Children as an honorary relieving medical officer; in 1911 he was appointed an honorary assistant physician, and in 1922 an honorary physician. From 1926 to 1939 he was clinical lecturer of the University of Sydney in medical diseases of children. He was a member of the Council of the British Medical Association (New South Wales Branch) from 1932 to 1941, and was President

in 1936. In 1938 he was made a Foundation Fellow of The Royal Australasian College of Physicians. He was closely associated with many other activities. He was a member of the Post-Graduate Committee in Medicine for many years, and for a time was acting secretary; later on he was made a life member of this committee. He was for a number of years a member of the New South Wales Consultative Council for the Physically Handicapped, an organization which was originally established to help in the investigation of the causation and treatment of poliomyelitis. For many years he was a member and later became President of the Bush Nursing Association. For more than ten years before his death he was an honorary physician on the staff of the Eastern Suburbs Hospital. During the last war and for several years afterwards he was a member of the medical board which sat first at the Barracks, Moore Park Road, and later at Marrickville. He took a personal interest in many of the servicemen whom he was "boarding". Although not connected with the naval branch of the armed services, he was always anxious to learn all that he could about members of the navy whom he came in contact with. He made many life-long friends because it was customary for him to stop and speak to naval officers from overseas, and would frequently invite them to his home and so make them feel that they were not strangers in a strange country. Many young naval officers whom he got to know in this way kept up a correspondence with him after they had returned to their homeland, and did this right up to the time of his death. For many years he took

a particular interest in the Far West Children's Health Scheme, and made several trips to the country to examine children who came under this scheme. For several years before his death he was honorary advisory physician to Scarba Welfare Home for Children, a branch of the Benevolent Society of New South Wales.

Edgar Stephen was a remarkable man and came of a very distinguished family, many members of which were of the legal profession. His grandfather was Sir Alfred Stephen, who for a time was chief legal adviser to the Tasmanian Government, and later on became Chief Justice of New South Wales. Another of his ancestors was an eminent lawyer and editor who actively cooperated with Wilberforce to secure the abolition of slavery.

Stephen devoted the greater part of his professional life to work amongst children, a branch of medicine which he was particularly suited for. He always seemed to make children feel and show happiness whether he was examining or merely talking to them. The terms of endearment which he so often used when dealing with children were not used in a frivolous manner, but came from the bottom of his heart. He seemed to have that rare gift of being able to meet children and converse with them on their own level, as it were. I feel sure that he took up the profession of medicine from purely altruistic motives, and there is no doubt that he achieved success in his chosen profession. He gave of his best to all those whom he came in contact with, and won the esteem and respect of his fellow men. As a young man, when I first knew him, he was always debonair and had a rather aristocratic bearing. As a clinical lecturer he excelled; and as he loved this work, he held the interest of his students. He was naturally talkative and vivacious, and was generally cheerful and animated in the lecture theatre. He was much sought after as an after-dinner speaker, and was never at a loss for a word to express his thoughts. At private dinners, either at his own home, where he was a perfect host, or when dining with friends, he always had plenty of light easy talk and was usually genial, sympathetic and agreeable. He enjoyed presiding at meetings, and when he did so the meeting generally went smoothly and with few dull moments. He was an exceptionally prompt and good letter writer. It has been said that the true use of a letter is to let one know that one is remembered and valued. In the event of any unusual occurrence in the life of any of his numerous friends or their families, he never failed to send along promptly a short letter of encouragement, congratulation or condolence according to circumstances. One of his best assets was his social geniality. He possessed that light touch which gives effervescence to social intercourse. Dr. Edgar Stephen will be held in affectionate remembrance by his numerous friends both within and outside the medical profession.

A colleague who wishes to remain anonymous writes: Edgar Stephen has gone from amongst his friends, and we grieve in our hearts.

I met him first in 1927 and soon learned of the gift he had for handling children, the tireless attention he bestowed upon sick ones in his care, and the simplicity and humility with which he assessed his own part in their cures.

To walk through the wards of the Children's Hospital by his side was a never-to-be-forgotten experience calculated to instruct, entertain and test the endurance of his companions, for nothing was hurried, nothing was overlooked, nothing was put aside in the detailed thoroughness of his methods. His quaint idiom and his apparently inconsequent approach to the steady gaze of a three-year-old often surprised the visiting clinician; also too did the subsequent placid and adequate examination of the child's throat and tympanic membrane! And be it said in passing that these two procedures were never under any circumstances omitted from his routine. He was in charge of the diabetic clinic of the hospital in its earliest years, and the manner in which he identified himself with the life of the patients, interested himself in their school life, pastimes and most importantly their diets, was a large factor in the regular attendance so vital to the success of such a clinic. In those days of carbohydrate-restricted diets, one of his patients, aged then about five years, was brought to the account of some chocolate belonging to his neighbour, and wailed in explanation, "But, doctor, I like the taste!", and the consequence of that was still further conferences with the sister-in-charge to see that the human appeal in that wail was served in so far as it was possible. At the annual Christmas party, the record of high places in school, prizes and "reciting at our breaking up" were just as pleasing to Dr. Stephen as a whole page of minuses opposite the Benedict test.

Clinical teaching of students was to him a responsibility in which he took considerable care in the preparation of material, and worried a good deal as to the success of his results. Once he had overcome the strangeness and self-consciousness of the fifth-year student or the new junior resident medical officer, a pleasant and instructive partnership was likely to ensue—though in a few instances this was not achieved. His wit was keen and sometimes unappreciated. After a series of questions to a nervous student meant to elicit information on the closing of sutures, he turned to a resident medical officer and said: "My fontanelle is closed. Is yours still open, doctor?" And although the student at last got the point, the interne was not amused. When, in 1939, the statutory time for his retirement to the consulting staff of the hospital arrived, the last afternoon round was conducted in a perfectly normal manner in the presence of some of his closest colleagues: as he stepped into his car at a quarter to six, he said firmly, "Thank you, all of you", and we walked back quietly, conscious of all we had left unsaid, and conscious too that it was his wish that it should be so.

I suppose it is true that some people cannot assess the character of Edgar Stephen in the light of intimate knowledge possessed by his friends, but it must be clear to all that he was a gifted children's doctor, a loyal servant of his hospital, and a man of humility and humour and faithfulness.

Dr. T. Y. Nelson writes: The death of Edgar Stephen will be deeply felt by the many people who came in contact with him during his long association with the Royal Alexandra Hospital for Children.

My first association with Stephen was in the out-patient department when, having finished my period of hospital residency and wondering what to do, I had spare time to fill in. I attended his clinic largely as one would go to a place to be entertained, but I very soon realized that beneath the constant flow of talk directed at the often bewildered parent or the nurse or anyone else that happened to be available, there was a profound knowledge of the problems of the care of children built up by a long association with out-patients, and in a busy practice.

This association led to my doing a locum for him and eventually being taken into his practice. He had a busy practice, and with the increasing demands of a teaching hospital, his time was fully occupied; but I never knew him other than courteous to his patients, and he would spend what seemed to me an interminable time interviewing people and discussing their problems, both at the hospital and in his practice.

His professional humility covered a very wide and practical knowledge of his specialty, as was evidenced by the extent of his consulting practice in his later years, and his often flippant and apparently superficial manner cloaked a deeply religious outlook.

He set a standard of practice which very few could live up to, but which has been a stimulus to the younger men following in his path.

Post-Graduate Work.

THE MELBOURNE PERMANENT POST-GRADUATE COMMITTEE.

Programme for May.

Courses for Part II of Higher Qualifications.

Radiodiagnosis.

Classes in radiodiagnosis for candidates for D.D.R. Part II and M.C.R.A. examinations will commence on May 17 at 4.30 p.m., continuing on Mondays and Thursdays at this time for about three months. This course will be conducted by the Melbourne Permanent Post-Graduate Committee, in consultation with the College of Radiologists. Enrolments, accompanied by the fee of £15 15s., should be made with the Committee by May 3.

Pathology.

Special pathology lectures for candidates for D.D.R. Part II and M.C.R.A. examinations will commence about July and will fit in with the radiodiagnosis lectures.

Psychiatry.

The Post-Graduate Committee, in consultation with the Australian Association of Psychiatrists, will conduct a series of post-graduate lectures in psychiatry suitable for D.P.M. candidates, starting on May 31 and continuing each Monday and Thursday evening for three months. The fee for this course is £14 14s., and enrolments should be made by May 15 at the Committee's office.

DISEASES NOTIFIED IN EACH STATE AND TERRITORY OF AUSTRALIA FOR THE WEEK ENDED MARCH 27, 1954.[1]

Disease.	New South Wales.	Victoria.	Queensland.	South Australia.	Western Australia.	Tasmania.	Northern Territory.	Australian Capital Territory.	Australia.
Acute Rheumatism	6(3)	1(1)	..	..	2(2)	..	..	..	9
Amœbiasis	..	..	..	..	..	..	..	..	..
Ancylostomiasis	..	..	..	..	..	..	8	..	8
Anthrax	..	..	..	..	..	..	..	..	..
Bilharziasis	..	..	..	..	..	..	..	..	..
Brucellosis	..	..	..	..	..	..	..	..	..
Cholera	..	..	..	..	..	..	..	..	..
Chorea (St. Vitus)	..	1(1)	..	..	..	..	..	..	1
Dengue	..	..	..	..	..	..	..	..	..
Diarrhœa (Infantile)	9(7)	32(29)	16(13)	..	..	..	4	..	61
Diphtheria	14(10)	5(3)	3	..	1	..	..	3	26
Dysentery (Bacillary)	..	1(1)	..	..	4(3)	..	..	..	5
Encephalitis	..	1	..	..	..	..	..	..	1
Filariasis	..	..	..	..	..	..	..	..	..
Homologous Serum Jaundice	..	..	..	..	..	..	..	..	..
Hydatid	..	1	..	..	..	..	..	..	1
Infective Hepatitis	..	12(7)	..	..	9(5)	..	..	..	21
Lead Poisoning	..	..	..	..	..	..	..	..	..
Leprosy	..	..	..	..	..	..	..	..	..
Leptospirosis	..	..	3(1)	..	..	..	..	..	3
Malaria	..	3(1)	..	..	..	..	..	..	3
Meningococcal Infection	4(2)	2(1)	1	..	..	..	..	..	7
Ophthalmia	..	..	..	..	..	..	..	..	..
Ornithosis	..	..	..	..	..	..	..	..	..
Paratyphoid	..	..	..	..	..	..	..	..	..
Plague	..	..	..	..	..	..	..	..	..
Poliomyelitis	44(19)	72(14)	6(2)	6(3)	47(24)	..	..	..	175
Puerperal Fever	1	..	1	..	..	..	..	..	2
Rubella	..	6(6)	..	..	12(6)	..	..	..	18
Salmonella Infection	..	..	..	..	3(3)	..	..	..	3
Scarlet Fever	11(8)	34(14)	2	2(2)	2(1)	..	..	..	51
Smallpox	..	..	..	..	..	..	..	..	..
Tetanus	..	..	..	..	..	..	1	..	1
Trachoma	..	..	..	..	..	..	..	..	..
Trichinosis	..	..	..	..	..	..	..	..	..
Tuberculosis	49(44)	14(11)	15(7)	2(2)	7(3)	4(2)	1	..	92
Typhoid Fever	..	..	..	1	1(1)	..	..	..	2
Typhus (Flea-, Mite- and Tick-borne)	..	..	..	..	..	..	..	..	..
Typhus (Louse-borne)	..	..	..	..	..	..	..	..	..
Yellow Fever	..	..	..	..	..	..	..	..	..

[1] Figures in parentheses are those for the metropolitan area.

DISEASES NOTIFIED IN EACH STATE AND TERRITORY OF AUSTRALIA FOR THE WEEK ENDED APRIL 3, 1954.[1]

Disease.	New South Wales.	Victoria.	Queensland.	South Australia.	Western Australia.	Tasmania.	Northern Territory.	Australian Capital Territory.	Australia.
Acute Rheumatism	9(7)	3(3)	6(4)	..	3(1)	..	..	..	21
Amœbiasis	..	2(2)	..	..	..	..	..	..	2
Ancylostomiasis	..	..	..	..	..	..	..	..	..
Anthrax	..	..	..	..	..	..	..	..	..
Bilharziasis	..	..	..	..	..	..	..	..	..
Brucellosis	..	..	..	..	..	..	..	..	..
Cholera	..	..	..	..	..	..	..	..	..
Chorea (St. Vitus)	..	..	..	..	..	..	..	..	..
Dengue	..	..	..	..	..	..	..	..	..
Diarrhœa (Infantile)	1	21(20)	20(9)	..	..	..	..	..	42
Diphtheria	4(2)	2(1)	..	..	..	..	..	1	7
Dysentery (Bacillary)	..	3(3)	1	..	2(1)	2(2)	..	..	8
Encephalitis	1	..	..	..	..	..	1	..	2
Filariasis	..	..	..	..	..	..	..	..	..
Homologous Serum Jaundice	..	..	..	..	..	..	..	..	..
Hydatid	..	..	..	..	..	1	..	..	1
Infective Hepatitis	5	20(7)	..	..	2	..	..	..	27
Lead Poisoning	..	..	..	..	..	..	..	..	..
Leprosy	..	..	1	..	..	..	..	..	1
Leptospirosis	..	..	..	..	..	..	..	..	..
Malaria	..	..	..	..	..	..	..	..	..
Meningococcal Infection	2(1)	4(4)	..	1	..	1	1	..	9
Ophthalmia	..	..	..	..	2	..	..	..	2
Ornithosis	..	..	..	..	..	..	..	..	..
Paratyphoid	..	..	..	..	..	..	..	..	..
Plague	..	..	..	..	..	..	..	..	..
Poliomyelitis	23(6)	17(9)	4(4)	5(4)	29(11)	1	..	1	80
Puerperal Fever	..	..	..	..	..	..	..	..	..
Rubella	..	11(11)	..	..	3(2)	..	..	..	14
Salmonella Infection	..	..	..	..	..	..	..	..	..
Scarlet Fever	14(8)	35(19)	6(1)	2(2)	7(4)	..	..	2	66
Smallpox	..	..	..	..	..	..	..	..	..
Tetanus	..	..	2(1)	..	..	..	..	..	2
Trachoma	..	..	..	..	1	..	..	..	1
Trichinosis	..	..	..	..	..	..	..	..	..
Tuberculosis	39(32)	20(13)	16(6)	4(3)	6(2)	2(1)	2	..	89
Typhoid Fever	1(1)	1(1)	..	..	..	..	..	..	2
Typhus (Flea-, Mite- and Tick-borne)	..	..	1	..	..	..	..	..	1
Typhus (Louse-borne)	..	..	..	..	..	..	..	..	..
Yellow Fever	..	..	..	..	..	..	..	..	..

[1] Figures in parentheses are those for the metropolitan area.

Ophthalmology.

Commencing on Monday, May 3, the Victorian Section of the Ophthalmological Society of Australia (British Medical Association) will conduct a course of over seventy sessions in ophthalmology, including special pathology, for candidates for D.O. Part II examinations. These will be held chiefly on Mondays, Thursdays and Fridays, in the late afternoon. The fee for the course is £31 10s., and enrolments should be made with the Melbourne Permanent Post-Graduate Committee.

M.D. Part II and M.R.A.C.P.

Commencing in June, on five mornings a week, the honorary staff of the Alfred Hospital will conduct an eight weeks' course suitable for candidates for M.D. Part II and M.R.A.C.P. Enrolments should be made with the Melbourne Permanent Post-Graduate Committee. The fee is £31 10s.

D.L.O. Part II.

Those interested in attending a course suitable for candidates for D.L.O. Part II are asked to contact the Post-Graduate Committee.

Courses for Part I of Higher Qualifications.

Courses for candidates for Part I of higher qualifications will be continued in May at the University.

Country Courses.

Bendigo.

On May 8 at 2.15 p.m., at Bendigo, the Melbourne Permanent Post-Graduate Committee will conduct a symposium on diarrhœa, consisting of lectures followed by discussion. The lecturers will be Dr. John Colebatch, pædiatrician, Dr. R. Andrew, physician, and Dr. A. Kelly, surgeon, in that order. The fee for the course is £2 2s. Inquiries should be made from Dr. A. J. Walters, 514 High Street, Golden Square, Bendigo.

Koroit.

On May 22, at Koroit, Dr. J. Game will speak on "Headaches" at 4 p.m., and Dr. G. Swinburne on "Deafness" at 8 p.m. Enrolments should be made with Dr. W. R. Angus, Koroit Street, Warrnambool.

Ballarat.

On May 27 at 8 p.m., at Craig's Hotel, Ballarat, Dr. Byron Stanton will lecture on "Modern Therapeutics and Prescribing". Enrolments should be made with Dr. J. P. L. Griffiths, 6 Dowling Street, Ballarat.

Fees.

Except in the case of the symposium at Bendigo, the fees for the above courses are at the rate of 15s. per lecture, but those who have paid an annual subscription to the Committee are invited to attend without further charge.

Flinders Naval Depot.

On May 12 at 2.30 p.m., Mr. Leonard Ball will lecture at Flinders Naval Depot on "Post-Operative Complications". This is by arrangement with the Royal Australian Navy.

Inquiries.

The address of the Melbourne Permanent Post-Graduate Committee is 394 Albert Street, East Melbourne. Telephone: FB 2547.

THE POST-GRADUATE COMMITTEE IN MEDICINE IN THE UNIVERSITY OF SYDNEY.

Lecture and Clinical Meeting at Balmoral Naval Hospital.

The Post-Graduate Committee in Medicine in the University of Sydney announces that Dr. Malcolm Whyte will give a lecture on "Agranulocytosis" on Tuesday, May 18, 1954, at 2 p.m., at the Balmoral Naval Hospital. Clinical cases will be shown after the lecture. All members of the medical profession are invited to attend.

Deaths.

The following death has been announced:

Smith.—George Henry Walton Smith, on April 18, 1954, at Sydney.

Corrigendum.

Owing to an unfortunate error, the first line has been omitted from the title of the article by D. M. McLean and W. J. Stevenson on page 636 of this issue. The title should read "Serological Studies on the Relationship between Australian X-Disease and the Virus of Murray Valley Encephalitis". We regret this error and offer our apologies to the authors for the omission.

Diary for the Month.

April 24.—Victorian Branch, B.M.A.: Country Branch Meeting.
April 27.—New South Wales Branch, B.M.A.: Ethics Committee.
April 28.—Victorian Branch, B.M.A.: Branch Council Meeting.
April 29.—South Australian Branch, B.M.A.: Scientific Meeting.
April 29.—New South Wales Branch, B.M.A.: Branch Meeting.
May 1.—Victorian Branch, B.M.A.: Country Branch Meeting.
May 4.—New South Wales Branch, B.M.A.: Organization and Science Committee.
May 5.—Victorian Branch, B.M.A.: Clinical Meeting.
May 5.—Western Australian Branch, B.M.A.: Council Meeting.
May 7.—Queensland Branch, B.M.A.: General Meeting.
May 11.—New South Wales Branch, B.M.A.: Executive and Finance Committee.
May 14.—Queensland Branch, B.M.A.: Council Meeting.

Medical Appointments: Important Notice.

Medical practitioners are requested not to apply for any appointment mentioned below without having first communicated with the Honorary Secretary of the Branch concerned, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

New South Wales Branch (Medical Secretary, 135 Macquarie Street, Sydney): All contract practice appointments in New South Wales.
side Victoria.

Queensland Branch (Honorary Secretary, B.M.A. House, 225 Wickham Terrace, Brisbane, B17): Brisbane Associated Friendly Societies' Medical Institute; Bundaberg Medical Institute. Members accepting LODGE appointments and those desiring to accept appointments to any COUNTRY HOSPITAL or position outside Australia are advised, in their own interests, to submit a copy of their Agreement to the Council before signing.

South Australian Branch (Honorary Secretary, 178 North Terrace, Adelaide): All Contract Practice appointments in South Australia.

Western Australian Branch (Honorary Secretary, 205 Saint George's Terrace, Perth): Norseman Hospital; all Contract Practice appointments in Western Australia. All government appointments with the exception of those of the Department of Public Health.

Tasmania: Part-time specialist appointments for the north-west coast of Tasmania.

Editorial Notices.

Manuscripts forwarded to the office of this journal cannot under any circumstances be returned. Original articles forwarded for publication are understood to be offered to The Medical Journal of Australia alone, unless the contrary be stated.

All communications should be addressed to the Editor, The Medical Journal of Australia, The Printing House, Seamer Street, Glebe, New South Wales. (Telephones: MW 2651-2.)

Members and subscribers are requested to notify the Manager, The Medical Journal of Australia, Seamer Street, Glebe, New South Wales, without delay, of any irregularity in the delivery of this journal. The management cannot accept any responsibility or recognize any claim arising out of non-receipt of journals unless such notification is received within one month.

Subscription Rates.—Medical students and others not receiving The Medical Journal of Australia in virtue of membership of the Branches of the British Medical Association in the Commonwealth can become subscribers to the journal by applying to the Manager or through the usual agents and booksellers. Subscriptions can commence at the beginning of any quarter and are renewable on December 31. The rate is £5 *per annum* within Australia and the British Commonwealth of Nations, and £6 10s. *per annum* within America and foreign countries, payable in advance.